“Global parameters of social economy clustering”

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GLOBAL PARAMETERS OF SOCIAL ECONOMY CLUSTERING

Abstract

The study of various aspects of social economy is stipulated by the fact that the focus of any economic system is the human being as the main object and the result of economic activity. The purpose of this paper is to cluster of social economies of the countries throughout the world with distinguishing the models of social economy for transition economies under globalization conditions.

The results of research represent four clusters of social economy that prove validity of classification of 4 classic models of social economy: liberal, Scandinavian, corporatist, and Mediterranean. While the most developed countries have effective models of social economy, there is still no clear concept of social development for transition economies. This paper deals with social economy clustering of different countries with the view to determinate the place of transition economies in social metrics of global economy.

Our study is limited to the number of countries – 40 countries of the world, mainly European, and timeframes – 2015 and 2016.

The obtained results could be taken into account by governments when developing and implementing new social policy for transition economies considering the experience of countries with classical social models. The authors propose the main practical tools for transition social model.

It is proposed to distinguish one more model of social economy – the transition model, typical for transition economies that implement social reforms and has some common features.

Keywords model of social economy, clustering, parameters, transition economy, globalization, global indices

JEL Classification C38, F01, H55

INTRODUCTION

Nowadays it is clear that globalization has a dual nature. On the one hand, this process has many advantages, the most important of which include growing interrelationships, interdependence and interactions between different global actors and environments, free movement, global market for consumers and others. On the other hand, globalization has some negative aspects that cause global problems and global challenges. It is essential to mention the most significant of them, such as global crises, conflicts, shortage of resources, hunger, social inequality, lack of drinking water, emigrants, loss of tradition and cultural features, environmental pollution and others. All these global challenges have a big negative impact on the life of people. Thus, only the concept of social economy can help to solve these global problems and provide global well-being.

In this sense, social metrics of global economy implies grouping countries according to their social models that react to global challenges. It also shows the place of transition economies among economies of other countries.

Scientists O'Boyle E., O'Boyle M. (2011), Muthayya, Rah, Sugimoto, Roos, Kraemer, Black (2013). Clapp (2014), addressed the global problems of hunger, poverty and proposed some economic ways of their solution. Some Ukrainian articles are focused on financial crises as the form of globalization manifestation (Bodrov, 2014; Lysenko, 2014; Stukalo, 2010). Other authors also investigated global challenges, but these studies do not show any strong relations between the concept of social economy and solution of global problems. That is why investigation of social economies under globalization conditions is a significant gap in research.

Therefore, research into models of social economy and their adaptation to transition economies under globalization conditions is a relevant and quite new subject of research.

1. LITERATURE REVIEW

A variety of models of social economy has been explained historically from the position of different strategies of social and economic development of countries. The term of social economy first appeared in 1830, but the role and great importance of social models were recognized only at the end of the 1980s (Mundura, 2015, pp. 728-729). This led to functioning of different social models.

For deeper understanding of different nature of classifications, existence of specific criteria of classification should be considered. Esping-Andersen (1990) offered the following criteria for classification of social economy: the pattern of political formation of working-class, political coalition building in the course of transition from rural economy to middle-class society (Esping-Andersen, 1990, p. 32). Based on these criteria, Esping-Andersen (1990, p. 27) wrote about the liberal, corporatist and social democratic (or Scandinavian) types of regimes in social economy. The liberal model is typical for the USA, UK, New Zealand and Australia. It is characterized by the developed market, minimum state guarantees, social security, and social protection of socially vulnerable groups. The corporatist model is typical for Germany, Austria and the Netherlands. This model is based on the principles of subsidiary and solidarity. The Scandinavian model is developed in Sweden, Finland, Denmark and Norway. It is characterized by the universal system of social protection and a high level of state social security.

In the subsequent study of the models of social economy, Belgian professor Sapir added one more model to the three mentioned above models, the Mediterranean social model (Sapir, 2005, p. 6). This model is characterized by a high share of social transfers to pensions and active stimulation of unemployment in the labor market.

Some issues of social models were explored by such scholars as Schelkle (2005), Shimmelfennig (2000), Ph. Van Parijs (2015), Mudura (2015), Menshikov et al. (2017), Monzon and Chaves (2008). Their papers focus on the concept, evolution, models and the future of European social economy. Also, the authors developed the classification of models of social economy and described their main features. Mainly, scholars based on Esping-Andersen's classification of social models, who wrote about the liberal, corporatist and social democratic (or Scandinavian) types of social economy (1990).

The global aspect of social economy has been identified by Grigoriev and Hitov (2014), Kvaratskhelia (2017), Röpke (1979), Restakis (2007). The research outcome of these authors is definition of social economy and its development under globalization conditions.

Despite significant achievements of these authors, the issue of clustering of social models for different countries and definition of the place of transition economies in this grouping remains unsolved.

The aim of this article is to cluster of social economies of the countries throughout the world with distinguishing the models of social economy for transition economies under globalization conditions.

2. METHODS

To determine global parameters of social economies and to assess their efficiency a number of global indices have been used. In the article, we have conducted cluster analysis to group coun-

tries according to the model of social economy. Clustering of models of social economy demonstrates the prospects of social development for countries in their transition period, considering experience of the developed countries.

Methodologically, the model of social economy is based on various social and economic systems, which offer different and sometimes conflicting ways of solving social problems. Undoubtedly, a social model reflects the attitude of a state to each citizen and society as a whole that is the result of evolution of different parameters, such as economic, social, legal, cultural and others. These parameters are specific for each country and result in existence of various social models. However, not only parameters affect the formation of a model of social economy, but also social choices of each state. It should be emphasized that while developed countries possess well-formed social models, most transition economies lack transparent social policy. Thus, social economy clustering will make it possible to determine the place of transition economies among different social models and to propose the ways of adopting experience of developed countries.

3. RESULTS

In the last century, several models of social economy were distinguished. They are different in a certain set of parameters, but similar in terms of their viability and effectiveness. However, under the influence of globalization, some controversial issues related to changes in functioning of social models have been identified. This point is even more important for transition economies, as they have chosen the path of the social market economy.

In scientific literature, the main classification of the models of social economy was proposed by Esping-Andersen (1990, p. 27) who wrote about the liberal, corporatist and social democratic (or Scandinavian) models of social economy and Sapir who added to the this three models one more model, the Mediterranean social model (Sapir, 2005, p. 6).

All these models of social economy have been identified only for market economies, which formed the basis for well-being. It is essential to identify the position of transition economies among these models. It is important that a country can have effective social economy provided it has a strong economic basis (Simakhova, 2016, p. 263).

To determine global parameters of social economies and to assess their efficiency, a number of global indices are used:

1. Human Development Index (HDI) – an integral indicator reflecting the development of human potential (UNDP, 2016, p. 194). It is based on three HDI components: indicators of longevity, education (with two indicators) and income. Countries-leaders in Human Development Index in 2015 included Norway (0.949), Australia (0.939), Switzerland (0.939), Germany (0.926), Denmark (0.925) (Table 1), the countries with well-formed classical social models – Scandinavian, corporatist and liberal.

2. Social Progress Index (SPI) – an innovative index that measures well-being of society, without regard to GDP (Porter, Stern, & Green, 2016, p. 13). The components of SPI are satisfaction of basic human needs, foundation of well-being and opportunity. In 2016, the countries with the highest index included Finland (90.09), Canada (89.49), Denmark (89.39), Australia (89.13), Switzerland (88.87), and Sweden (88.80) (Table 1). As in the case of HDI, the first positions were occupied by highly developed countries with liberal, Scandinavian, and corporatist models of social economy.

3. Index of Economic Freedom (IEF) assesses the extent of the state economy regulation and represents the most significant institutional characteristics of a country for the economic growth (Miller & Kim, 2017, p. 20). It consists of 4 key aspects: rule of law, government size, regulatory efficiency, and market openness. According to Table 1, in 2017, New Zealand (83.7), Switzerland (81.5), Australia (81), Estonia (79.1), and Canada (78.5) had the highest index; these are mainly countries with liberal social economy model. It is not surprising, since this social model provides

Table 1. Global parameters of social development for some countries

Source: Human Development Report (2016), Social Progress Index (2016, 2017), Index of Economic Freedom, Global AgeWatch Index (2015), Happy Planet Index (2016).

Country	HDI (2015)	SPI (2016)	IEF (2016)	GAWI (2015)	HPI (2016)
Denmark	0.925	89.39	75.1	78.6	32.7
Switzerland	0..939	88.87	81.5	90.1	34.3
Austria	0.893	86.6	72.3	74.4	30.5
Norway	0.949	88.7	74	89.3	36.8
Finland	0.895	90.09	74	72.7	31.3
Ireland	0.923	87.94	76.7	72	30
Sweden	0.913	88.8	74.9	84.4	28
Netherlands	0.924	88.65	75.8	83	35.3
Cyprus	0.856	80.75	67.9	58.2	30.7
Belgium	0.896	86.19	67.8	63.4	23.7
Germany	0.926	86.42	73.8	84.3	29.8
Spain	0.884	85.88	63.6	61.7	36
UK	0.909	88.58	76.4	79.2	31.9
Slovenia	0.89	84.27	59.2	60.6	24.6
France	0.897	84.79	63.3	71.2	30.4
Poland	0.855	79.76	68.3	57.4	27.5
Estonia	0.865	82.62	79.1	64.9	17.9
Portugal	0.846	83.88	62.6	52.9	24.8
Slovakia	0.845	78.96	65.7	52.1	28.2
Hungary	0.836	76.88	65.8	52.2	26.4
Bulgaria	0.794	72.14	67.9	49.7	20.4
Ukraine	0.743	66.43	48.1	37	26.4
Serbia	0.776	71.55	58.9	41.7	29
Australia	0.939	89.13	81	71	21.2
Iceland	0.921	88.45	74.4	81.8	31.1
Canada	0.92	89.49	78.5	84	23.9
USA	0.92	84.62	75.1	79.3	20.7
New Zealand	0.915	88.45	83.7	76	31.3
Japan	0.903	86.54	69.6	80.8	28.3
Republic of Korea	0.901	80.92	74.3	44	24.8
Israel	0.899	75.32	69.7	70.1	28.8
Chile	0.847	82.12	76.5	66.3	31.7
Georgia	0.769	69.17	76	58.8	31.1
Lithuania	0.848	76.94	75.8	43.2	21
Latvia	0.83	76.19	74.8	55.2	17.1
Costa Rica	0.776	80.12	65	59.6	44.7
Mexico	0.762	70.02	63.6	56.3	40.7
Russia	0.804	64.19	57.1	41.8	18.7
Belarus	0.796	66.18	58.6	42.1	21.7
China	0.738	62.1	57.4	48.7	25.7

for the maximum capacity of individuals, encourages self-sufficiency in people. Economic freedom is important for the development of entrepreneurship and market economy.

4. Global Age Watch Index (GAWI) evaluates social policy on the elderly (Barry, McGwire, & Porter, 2015, p. 7). The index is based on four components: income security, health status, capability, and enabling environment. In 2015, Switzerland (90.1), Norway (89.3), Sweden (84.4), Germany (84.3), and Canada (84.0) took the leading positions by this index (Table 1). As far as HDI and SPI are concerned, they are highly developed countries with the classical social economy model (liberal, Scandinavian, and corporatist).

5. Happy Planet Index (HPI) is an index that reflects how happy, long and stable people's life is (NEF, 2016, p. 1). The index is based on four elements: well-being, life expectancy, inequality of outcomes, and ecological footprint. This is a subjective index. In 2016, Latin American countries – Costa Rica (44.7) and Mexico (40.7) – ranked first as for this index (Table 1), while highly developed countries were not among the leaders; thus, the US took 108th place (20.7), UK took 34th place (31.7), and Germany ranked 79th (29.8). The reason is that the classical social economy model offsets the value of the environmental component. Material welfare is often achieved at the cost of the damage to the environment. Costa Rica reached the highest position in this index due to the use of renewable energy (99% of used energy is renewable).

Analysis of global parameters presented in Table 1 shows that leading positions are occupied by the countries with classical models of social economy – liberal, Scandinavian and corporatist – in all considered rankings except HPI, where Latin America countries took the lead. It is caused by the fact that these countries pay great attention to the environmental component.

Based on the data in Table 1, we conducted cluster analysis to group countries according to the model of social economy. Cluster analysis is one of the tools of multivariate exploratory data analysis. It involves a great number of techniques and methods that can be applied in various fields of economic research (Řezanková, 2014, p. 73).

The main purpose of cluster analysis is to group a certain number of objects or features (in our case, countries) into homogeneous clusters. A significant advantage of cluster analysis is that it makes it possible to separate objects not only according to one parameter, but also according to the number of features, in our case according to 5 global indices.

Cluster analysis of distribution of countries by the model of social economy was conducted using software Stat Soft STATISTICA 7.0, which allowed to obtain homogeneous clusters that have dense grouping of figures around the center of distribution. The selected distance is Euclidean – the geographical distance in multidimensional space. It is the most common type of distance often used in cluster analysis, in the case when all the factors are of equal weight. Euclidean distance is derived from the formula:

$$d_e\left(X_i, X_j\right)=\left(\sum_k \left(x_{ik}-x_{jk}\right)^2\right)^{\frac{1}{2}}, \quad (1)$$

where $d_e\left(X_i, X_j\right)$ is the distance between X_i and X_j. Parameter X_i is the vector of measuring the i-th object. Parameter X_j is the vector of measuring j-th object.

Due to one of the methods of cluster analysis – joining (tree clustering) – consistent association of the nearest object in one cluster has been conducted. It is reflected in the graph of the tree association with indication of the distance between objects (0–14) (Figure 1). The tree diagram presents 40 countries. The number of parameters (global indices) is 5. Distance metric is Euclidean distances (non-standardized). Amalgamation (joining) rule: single linkage, where firstly, two closest objects that have the greatest measure of similarity were merged. Then, the object with the maximum degree of similarity to one cluster of objects was joined to these two objects. The distance between two clusters with single linkage is defined as the distance between the two closest objects in different clusters.

The tree diagram in Figure 1 shows which countries form clusters when the distance between the objects of one cluster is set at 2, 4, 6, 8, 10, 14. In the view of the obtained hierarchical trees, the optimum number of clusters is four, because the smaller number of clusters will lead to large distances between countries in the middle of one cluster.

Table 2 shows the mean and standard deviations of global parameters for countries.

Considering K-means, optimal clusters were generated by minimizing and maximizing intra variation among the group of the countries. Each cluster was given a number from 1 to 4. Figure 2 and Table 3 show the means of global indices for each group of countries.

Euclidean distances for each cluster are presented in Table 4.

Source: the authors' calculation.

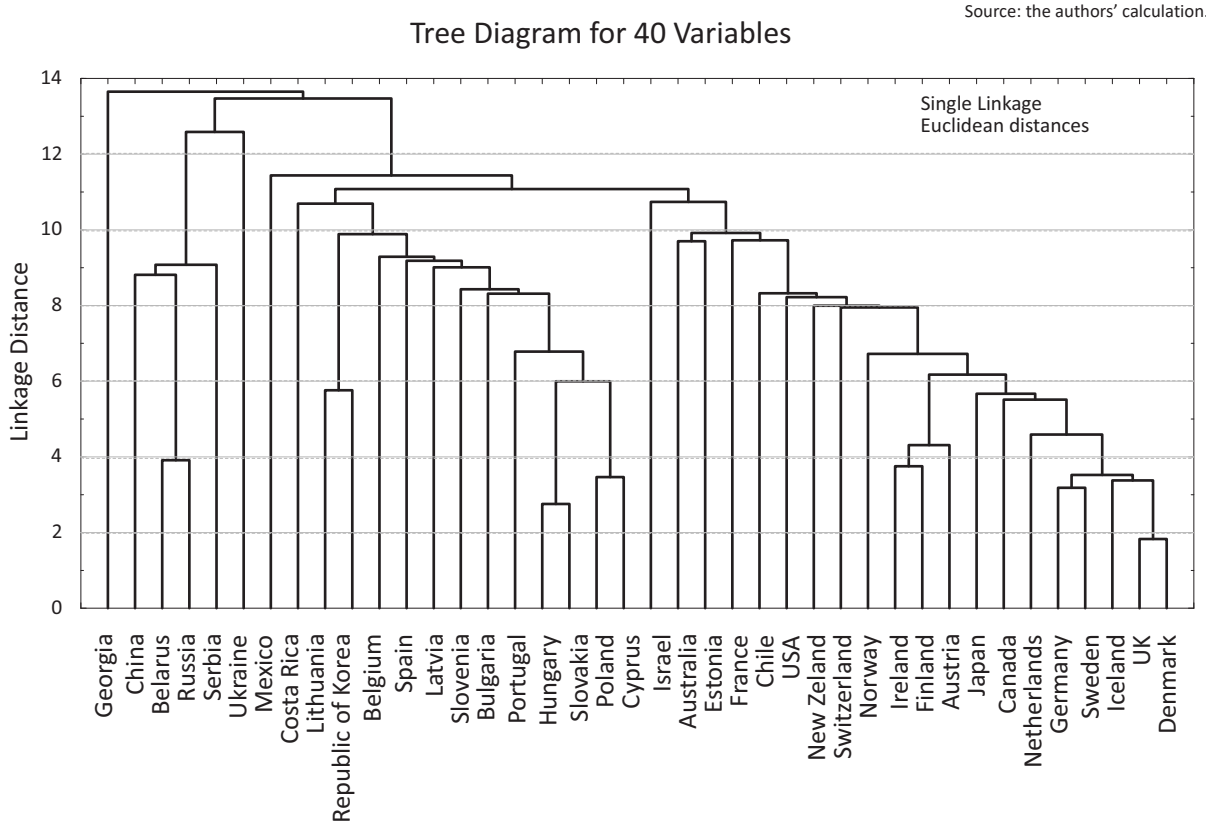

Figure 1. Tree diagram for 40 countries grouped by models of social economy

Table 2. Means and standard deviations

Source: the authors' calculation.

Country	Mean	Standard deviation
Denmark	55.34300	37.29762
Switzerland	59.14180	39.83323
Austria	52.93860	35.98882
Norway	57.94980	38.34848
Finland	53.79700	36.69947
Ireland	53.51260	36.68513
Sweden	55.40260	38.91145
Netherlands	56.73480	37.57066
Cyprus	47.68120	31.99199
Belgium	48.39720	34.98630
Germany	55.04920	37.94131
Spain	49.59680	32.44633
UK	55.39780	37.51624
Slovenia	45.91200	32.95765
France	50.11740	34.02892
Poland	46.76300	32.18850
Estonia	49.07700	37.32721
Portugal	45.00520	32.56317
Slovakia	45.16100	31.08036
Hungary	44.42320	30.80410
Bulgaria	42.18680	30.83358
Ukraine	35.73460	24.53701
Australia	52.65380	39.16109

Table 2 (cont.). Means and standard deviations

Country	Mean	Standard deviation
Iceland	55.33420	37.77794
Canada	55.36200	40.23062
USA	52.12800	38.50889
New Zealand	56.07300	38.29071
Japan	53.22860	37.07175
Republic of Korea	44.98420	33.55032
Israel	48.96380	32.74211
Chile	51.49340	34.42162
Georgia	47.16780	31.07138
Lithuania	43.55760	33.49269
Latvia	44.22400	34.05541
Costa Rica	50.03920	30.31278
Mexico	46.27640	27.69023
Serbia	40.38520	27.45124
Russia	36.51880	26.50579
Belarus	37.87520	26.85625
China	38.92760	25.52991

Source: the authors' calculation.

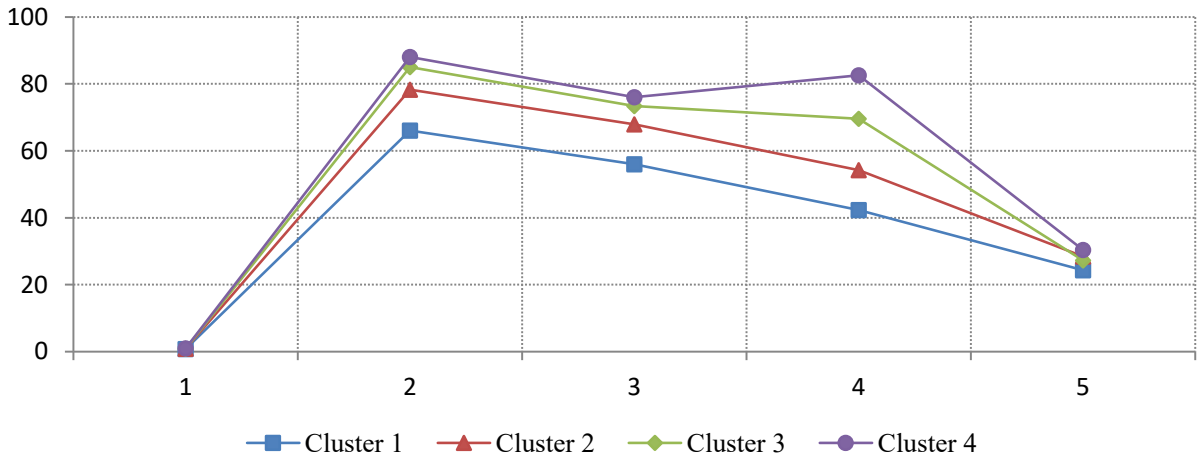

Figure 2. Graphs of means for clusters 1-4

Table 3. Cluster means for clusters 1-4

Source: the authors' calculation.

Global indices	Cluster 1	Cluster 2	Cluster 3	Cluster 4
HDI	0.77140	0.83514	0.89489	0.92200
SPI	66.09000	78.27143	84.97778	88.08000
IEF	56.02000	67.89286	73.37778	76.06667
GAWI	42.26000	54.20714	69.55556	82.56667
HPI	24.30000	28.42857	27.27778	30.34167

Table 4. Euclidean distances between clusters 1-4

Clusters	No. 1	No. 2	No. 3	No. 4
No. 1	0.00000	89.82706	282.3941	509.3162
No. 2	9.47771	0.00000	62.3922	194.1898
No. 3	16.80458	7.89888	0.0000	39.1062
No. 4	22.56803	13.93520	6.2535	0.0000

Table 5. Analysis of variance

Global indices	Between SS	df	Within SS	df	F	signif. p
HDI	0.103	3	0.037	36	33.3248	0.000000
SPI	1958.089	3	575.871	36	40.8027	0.000000
IEF	1583.339	3	866.419	36	21.9294	0.000000
GAWI	8101.945	3	817.110	36	118.9844	0.000000
HPI	139.446	3	1284.673	36	1.3026	0.288541

Table 5 shows analysis of variations, caused by factor variable. Thus, it is given the value between group variation (between SS) and within group variation (within SS). Parameters F and p characterize contribution of each index to global division of countries into groups. The best clustering is characterized by higher values of F and smaller values of p.

According to Table 6, F-statistics shows that the greatest measure of discrimination is GAWI (maximum F-statistic 118.9844), so this index separates the clusters more transparently. This shows the importance of social policy for the elderly. HPI (F-statistics 1.3026) distinguished the groups of countries in smaller degree.

We will investigate the means and states, forming clusters in more detail. According to Figure 2, Table 2 and Table 5, cluster 1 is characterized by the lowest rates of global indices among other clusters.

Table 6. Descriptive statistics for cluster 1

Global indices	Mean	Standard deviation	Variance
HDI	0.77140	0.030047	0.00090
SPI	66.09000	3.516582	12.36635
IEF	56.02000	4.492995	20.18700
GAWI	42.26000	4.174087	17.42300
HPI	24.30000	4.079828	16.64500

According to Table 7, cluster 1 is the least numerous and includes only 5 countries: Serbia, Ukraine, Russia, Belarus, and China. These countries are transition economies, grouped by similarity of global indices.

Table 7. Countries, belonging to cluster 1 and distances from respective cluster center

Countries, belonging to cluster 1	Distance
Ukraine	4.357072
Serbia	3.478782
Russia	2.696259
Belarus	1.640165
China	3.500263

In our opinion, counties in cluster 1 are grouped due to effectiveness of their social policy. Social policy of transition economies is characterized by a large number of social problems (Marangos, 2008). The social sphere of countries of cluster 1 is in transition state, as well as the economic system. This led to relatively low social payments and low social budget expenditures compared with those in developed countries, to the problems of inequality and low incomes. In addition, a high level of bureaucracy is typical for this kind of social policy. The main positive feature of this social model is a high level of education. It can be one of comparative advantages for cluster 1.

Thus, the authors consider that the social model of cluster 1 is a separate model of social economy and offer to name it "a transition model", basic legal documents of these countries contain social principles, but they are not implemented to the full. Therefore, transition model of social economy is a special model, characterized by a number of social problems, but intended to solve them using the experience of developed countries.

Cluster 2, according to Figure 2, Table 2, and Table 8, has a medium rate of all global parameters, but a high rate of HPI.

Table 8. Descriptive statistics for cluster 2

Global indices	Mean	Standard deviation	Variance
HDI	0.83514	0.044623	0.00199
SPI	78.27143	5.113642	26.14934
IEF	67.89286	5.372074	28.85918
GAWI	54.20714	5.801653	33.65918
HPI	28.42857	7.740844	59.92066

Cluster 2 is the most numerous of all the clusters and brings together 14 countries. They are quite different in their economic and social development (Table 9) and include Cyprus, Spain, Slovenia, Poland, Portugal, Slovakia, Hungary, Bulgaria, Republic of Korea, Georgia, Lithuania, Latvia, Costa Rica, and Mexico.

Table 9. Countries, belonging to cluster 2 and distances from respective cluster center

Countries, belonging to cluster 2	Distance
Cyprus	2.334356
Spain	6.141333
Slovenia	5.780626
Poland	1.639426
Portugal	3.856052
Slovakia	1.398224
Hungary	1.700579
Bulgaria	4.947089
Republic of Korea	5.751922
Georgia	5.946377
Lithuania	6.937387
Latvia	6.072992
Costa Rica	7.818333
Mexico	6.949648

Three countries of cluster 2 – Cyprus, Spain and Portugal – are among the countries with the Mediterranean classical social economy model. They focus on providing high standards of pension and employment policy. The other countries of cluster 2 have no clearly identified model of social economy, but they also tend to follow the Mediterranean model. Most of them (Poland, Slovenia, Hungary, Georgia, Slovakia, Bulgaria, Lithuania and Latvia) are the countries with transition economy, paying enough attention to the social sector. Of course, they have a high level of development of pension system and employment. Cluster 2 includes two Latin American countries – Mexico and Costa Rica. They are leaders in HPI ranking, which could be explained by a high value of this index in cluster 2.

Cluster 3, according to Figure 2 and Table 10, is characterized by sufficiently high levels of global indices, except the medium value of HPI (lower than for countries of cluster 2).

Table 10. Descriptive statistics for cluster 3

Global indices	Mean	Standard deviation	Variance
HDI	0.89489	0.027269	0.00074
SPI	84.97778	4.517820	20.41069
IEF	73.37778	5.694027	32.42194
GAWI	69.55556	3.784545	14.32278
HPI	27.27778	5.040778	25.40944

Cluster 3 includes 7 developed countries – Austria, Finland, Ireland, Belgium, France, Australia, and Israel, one transition economy – Estonia, and one developing country – Chile (Table 11). It should be noted that the last two countries (Estonia and Chili) implemented active and effective social policy.

Table 11. Countries, belonging to cluster 3 and distances from respective cluster center

Countries, belonging to cluster 3	Distance
Austria	2.743887
Finland	3.243078
Ireland	2.576762
Belgium	4.080991
France	4.775968
Estonia	5.439131
Australia	4.782614
Israel	4.677870
Chile	3.100714

Most countries in Cluster 3 follow classic social models: liberal (Ireland, Australia, and Israel), Scandinavian (Finland), and corporatist (Austria, France, and Belgium). Estonia and Chile do not have the classic social economy model, but mainly tend to the corporatist social model, as they have active social policy.

According to Figure 2 and Table 12, the countries of Cluster 4 have the highest global parameters of all the clusters.

Table 12. Descriptive statistics for cluster 4

Global indices	Mean	Standard deviation	Variance
HDI	0.92200	0.012490	0.00016
SPI	88.08000	1.451601	2.10715
IEF	76.06667	3.706587	13.73879
GAWI	82.56667	4.213255	17.75151
HPI	30.34167	4.630425	21.44083

Cluster 4 includes 12 highly developed countries (Table 13) – Denmark, Switzerland, Norway, Sweden, Netherlands, Germany, UK, Iceland, Canada, USA, New Zealand, and Japan.

Table 13. Countries, belonging to cluster 4 and distances from respective cluster center

Members of cluster 4	Distance
Denmark	2.188458
Switzerland	4.529128
Norway	4.282618
Sweden	1.464521
Netherlands	2.243607
Germany	1.496078
UK	1.680722
Iceland	0.903053
Canada	3.208075
USA	4.827813
New Zealand	4.526461
Japan	3.208715

Thus, cluster 4 includes the most developed countries of the world with highly developed social economy. It is interesting that the cluster includes the countries with classical social models: liberal (Britain, Canada, USA, and New Zealand), Scandinavian (Denmark, Norway, Sweden, Iceland), and corporatist (Switzerland, Netherlands, Germany). Only Japan from the list of cluster 4 is not characterized by the classical model of social economy as it possesses the features of different social models and has a mixed type.

4. DISCUSSION

Generalization of the data, derived from cluster analysis, is presented in Table 14.

The major findings, resulted from analysis of above, show the necessity of distinguishing transition social model since the classical social models do not meet all modern requirements. Nowadays, transition economies have specific model of social economy that we propose to name "a transition model", which is characterized by low social expenditures, low incomes, social inequality, but high level of education. It supplements existing classification of models of social economy (Esping-Andersen, 1990; Sapir, 2005) with the transition model. However, it is characterized by a number of social problems and requires the experience of the countries with classical models of social economy.

It can also be concluded that highly developed economies have liberal, Scandinavian or corporatist models, while less developed countries and transition economies have either transition or Mediterranean models, because both of them are more oriented to solving social problems and strong pension provision.

Globalization challenges national economies with a number of new problems (Clapp, 2014; Stukalo, 2010; Golob, Podnar, Lah, 2009), such as financial crises, emigration, energy dependence and other. Transition economies suffer from these global impacts more than developed countries, because of some economic and social problems. Consideration of peculiarities of transition model helps to address these challenges and to develop techniques of effective regulation of social sphere.

Some of presented findings about effectiveness and necessity of social economy under modern

Table 14. Distribution of clusters 1-4 according to the countries and models of social economy

Clusters	Countries	Social model
Cluster 1	Serbia, Ukraine, Russia, Belarus, China	Transition model
Cluster 2	Cyprus, Spain, Slovenia, Poland, Portugal, Slovakia, Hungary, Bulgaria, Republic of Korea, Georgia, Lithuania, Latvia, Costa Rica, Mexico	Mediterranean model
Cluster 3	Austria, Finland, Ireland, Belgium, France, Australia, Israel, Estonia, Chile	Scandinavian, liberal, and corporatist models
Cluster 4	Denmark, Switzerland, Norway, Sweden, Netherlands, Germany, UK, Iceland, Canada, USA, New Zealand, Japan	Scandinavian, liberal, and corporatist models

conditions are similar to developments of such authors as Menshikov et al. (2017), Peng (2012), Restakis (2007), Schelkle (2005), and Witt (2002). In contrast to the findings, presented by the authors, who investigated the role of social economy for some countries (like Germany, Japan, and South Korea) or a group of countries (European countries), we study social economy at the global level. This allowed us to develop social metrics of global economy.

CONCLUSION

The conducted cluster analysis made it possible to identify different groups of models of social economy depending on their effectiveness in terms of global parameters. The results of research represent four clusters of social economy that prove validity of classification of 4 classic models of social economy: liberal, Scandinavian, corporatist, and Mediterranean. However, cluster 1 includes the countries that do not belong to the classical social economy grouping of countries: Serbia, Ukraine, Russia, Belarus, and China. The authors propose to distinguish one more model of social economy – the transition model. It is typical for the countries with transition economies that implement social reforms and has the following common features and characteristics: high educational potential, low social budget expenditures, low incomes of population, and high bureaucracy.

The obtained results contribute to better understanding of social economic policy under globalization conditions as the way of solving the global problems. They differ from the findings of other authors, because we propose a transition social model. On the other hand, they extend knowledge of grouping countries according to models of social economy.

The acquired results could be taken into account by governments when developing and implementing new social policy for transition economies (countries from cluster 1) considering the experience of countries from clusters 2-4. Thus, we consider that the main practical tools for transition social model based on positive experience of cluster 2-4 include:

- income policy (flat tax, adjustment of minimum wage and pension, development of social security, etc.);
- financial assistance to the social sector (education, medicine, culture, environment, etc.);
- employment policy (stimulating employment, improving labor legislation to enhance trade unions, etc.).

Application of these tools of social economy can effectively manage social policy. Nevertheless, importance of ecological components of sustainable development should be taken into consideration, because developed countries often neglect it.

Our study is limited to the number of countries – 40 countries of the world, mainly European, and timeframes – 2015 and 2016.

The areas for subsequent research are supposed to include development of promising areas of social policy for transition economies.

REFERENCES

1. Barry, A., McGwire, S., & Porter, K. (2015), *Global Age Watch Index. Insight report*. London, UK: Help Age International.
2. Bodrov, V. (2014). Global financial crisis and problems of governmental regulation of internal market development in Ukraine. *Actual problems of international relations, 1*(92), 149-155.
3. Clapp, J. (2014). World Hunger and the Global Economy: Strong Linkages, Weak Action. *Journal of International Affairs, 67*(2), 1-17.
4. Esping-Andersen, G. (1990). *The Three Worlds of Welfare Capitalism*. Princeton, New Jersey: Princeton University Press.
5. Golob, U., Podnar, K., & Lah, M. (2009). Social economy and social responsibility:

alternatives to global anarchy of neoliberalism? *International Journal of Social Economics, 36*(5), 626-640. http://doi.org/10.1108/03068290910954068

6. Grigoriev, O., & Hitov, M. (2014). Interaction between Developed and Developing Countries – Growth Factor of Imbalances in the Global Economy (Theoretical Insight). *Godishnik na UNSS, 1,* 39-89.
7. Kvaratskhelia, M. (2017). World challenges and economics of Georgia. *Journal of Security and Sustainability Issues, 6*(4), 619-625, http://doi.org/10.9770/jssi.2017.6.4(7)
8. Lysenko, O. (2014). Global financial crisis and problems of governmental regulation of internal market development in Ukraine. *Сучасні проблеми розвитку підприємств харчової промисловості: теорія та практика [Current problems of development of foot industry enterprises: theory and practice],* 343.
9. Marangos, J. (2008). *Alternative Political Economy Models of Transition*. New Brunswick, USA & London, UK: Transaction Publishers.
10. Menshikov, V., Lavrinenko, O., Sinica, L., Simakhova, A. (2017). Network capital phenomenon and its possibilities under the influence of development of information and communication technologies. *Journal of Security and Sustainability Issues, 6*(4), 585-604, http://doi.org/10.9770/jssi.2017.6.4.(5)
11. Menshikov, V., Volkova, O., Stukalo, N., Simakhova, A. (2017). Social economy as a tool to ensure national security. *Journal of Security and Sustainability Issues, 7*(2), 211-231. https://doi.org/10.9770/jssi.2017.7.2(4)
12. Miller, T., & Kim, A. B. (2017). *Index of Economic Freedom*. Retrieved June 10, 2017 from http://www.heritage.org
13. Monzon, J. L., & Chaves, R. (2008). The European Social Economy: Concept and Dimensions of the Third Sector. *Annals of Public and Cooperative Economics, 79*(3/4), 549-577.
14. Mudura, L. M. (2015). The Evolution of the Social Economy Concept in Europe. *Annals of the University of Oradea, Economic Science Series, 24*(2), 728-734.
15. Muthayya, S., Rah, J. H., Sugimoto, J. D., Roos, F. F., Kraemer, K., Black, R. E. (2013). The Global Hidden Hunger Indices and Maps: An Advocacy Tool for Action. *PLoS ONE, 8*(6), e67860. https://doi.org/10.1371/journal.pone.0067860
16. NEF (2016). *The Happy Planet Index 2016*. Retrieved June 20, 2017 from http://www.happyplanetindex.org
17. O'Boyle, E., O'Boyle, M. (2011). Global poverty, hunger, death, and disease. *International Journal of Social Economics, 39*(1/2), 4-17. https://doi.org/10.1108/03068291211188848
18. Peng, I. (2012). Social and Political Economy of Care in Japan and South Korea. *International Journal of Sociology and Social Policy, 32*(11/12), 636-649. http://doi.org/10.1108/01443331211280683
19. Porter, M., Stern, S., & Green, M. (2016). *Social Progress Index 2016*. Retrieved June 1, 2017 from http://www.socialprogressimperative.org
20. Restakis, J. (2007). Defining the Social Economy: The BC Contex. Retrieved June 25, 2017 from http://www.msvu.ca/socialeconomyatlantic/pdfs/DefiningSocialEconomy_FnlJan1906.pdf
21. Řezanková, H. (2014). Cluster Analysis of Economic Data. *Statistika: Statistics and Economy Journal, 94*(1), 73-86.
22. Röpke, W. (1979). *Jenseits von Angebot und Nachfrage*. Bern; Stuttgart: Haupt.
23. Sapir, A. (2005). Globalisation and the Reform of European Social Models (Background document for the presentation at ECOFIN informal Meeting in Manchester, 9 Sept. 2005). Retrieved June 5, 2017 from http://www.bruegel.org
24. Schelkle, W. (2005). Can there be a European Social Model? *CIDEL conference: 'Law and Democracy in Europe's Post-National Constellation',* 22-24, 1-23.
25. Shimmelfennig, F. (2000). International Socialization in the New Europe. *European Journal of International Relations, 6, 109-139.* http://doi.org/10.1177/1354066100006001005
26. Simakhova, A. O. (2016). Analysis of the Foreign Economic Factors Impact on the Welfare of Ukrainians in the Conditions of the World Integration Processes. *Marketing and Management of Innovations, 3,* 263-271.
27. Stukalo, N. (2010). Global Crisis and National Economies: More Haste, Less Speed? *Actual Problems of International Relations, 92*(1), 55-62. Retrieved June 2, 2017 from http://journals.iir.kiev.ua/index.php/apmv/article/view/1064
28. UNDP (2016). *Human Development Report 2016. Human Development for Everyone.* New York, UNDP, USA; Canada: Lowe-Martin Group.
29. Van Parijs, Ph. (2015). Social Justice and the Future of the Social Economy. *Annals of Public and Cooperative Economics, 86*(2), 191-197.
30. Witt, U. (2002). Germany's "Social Market Economy" Between Social Ethos and Rent Seeking. *The Independent Review, 6*(3), 365-375.