

APPLICATION OF CLUSTER ANALYSIS TO STUDY THE SOCIO-ECONOMIC SITUATION OF EASTERN EUROPEAN COUNTRIES

Sofia R. Ladyk, Lviv National University named after I. Franko (Ukraine).

E-mail: ladik17@ukr.net

Kseniia F. Bazilyuk, Lviv Polytechnic National University (Ukraine).

E-mail: k.bazylyuk@gmail.com

DOI: 10.32342/2074-5362-2021-1-30-7

Key words: *socio-economic situation, human potential, inflation, unemployment, corruption, GDP, cluster analysis, dendrogram.*

The article considers issues related to the assessment of the socio-economic situation of Ukraine and 12 countries that are its close neighbors in the Eastern European region. It is established that today Ukraine is in a severe socio-economic crisis, which covers all spheres of society and affects the economic and political aspects of the entire Eastern European region. The deepening of the crisis in Ukraine is observed in all areas: the curtailment of production, declining employment, falling incomes and demand. With the deepening recession and budget crisis, it is difficult to carry out the necessary reforms of the Ukrainian state and economy, while the living standards of the majority of the population continue to fall, unemployment and inflation are rising.

The socio-economic potential of Ukraine and selected countries of Eastern Europe in the context of those indicators that directly relate to the social status of the population is studied. Using the World Bank statistics for 2019, the following indicators were analyzed: GDP per capita, unemployment rate (% of total labor force), inflation rate (%) and corruption index. The study found that Ukraine lags significantly behind its neighbors in macroeconomic indicators. Analysis of the data of the State Statistics Service shows that in Ukraine there is a deindustrialization of the economy and a decline in industrial production. At the same time, there is a decline in the science intensity of the economy in many sectors of the industrial complex (engineering, chemical, energy), which has significantly led to rising unemployment. Indicators such as low life expectancy at birth, high inflation and corruption also indicate a difficult socio-economic situation. It is established that the illustrated tendencies are largely due, on the one hand, to the unsuccessful institutional policy of the Government of Ukraine, and on the other hand – to corruption and domination of oligarchs in the leading sectors of the economy.

In order to classify the countries of Eastern Europe and identify among them the place of Ukraine in the context of selected characteristics of the socio-economic situation, cluster analysis was used, in particular the hierarchical method of Ward. As a result of using this method, a dendrogram was obtained, the visual analysis of which allows to form 4 clusters. The K-means method was used to form clusters. Based on the analysis of the constructed clusters, it was found that the highest rating in the selected indicators have the countries included in the 3rd cluster: Estonia, Poland and the Czech Republic, which are characterized by high welfare, low unemployment and corruption. Countries in the 2nd cluster have a slightly lower rating: Belarus, Bulgaria, Moldova, the Russian Federation, Romania and Hungary. These countries are characterized by a high level of corruption and a fairly high level of inflation, the rest of the indicators in this group are average. The 1st cluster includes: Latvia, Lithuania and the Slovak Republic, which have a high level of welfare, low levels of corruption and inflation, but at the same time high unemployment (average value – 6.1%). The lowest rating is given to Ukraine, which is characterized by falling incomes, high unemployment, inflation and corruption.

The study proves the need for urgent effective reforms and systemic transformations in Ukraine, which will promote the rational use of its own investment potential, improve the level of management and investment policy, as well as lobby for national economic interests and create conditions for economic and institutional stability.

References

1. Pryimak V.I., Tkach I.I. (2014). *Neiromerezheva model zalezhnosti liudskoho rozvytku krain svitu vid neekonomichnykh chynnykiv* [Neural network model of dependence of human development of the world on non-economic factors]. *Ukraina: aspekty pratsi* [Ukraine: aspects of work], 7, pp. 3-11 (in Ukr.).
2. Tkach I.I. (2014). *Klasternyi analiz mizhnarodnykh pokaznykiv liudskoho rozvytku v konteksti relihiinykh chynnykiv na osnovi neuronnoi merezhi Kokhonena* [Cluster analysis of international human development indicators in the context of religious factors based on the Kohonen neural network]. *Ekonomichnyi analiz: zb. nauk. prats* [Economic analysis: collection of scientific works]. Ternopil. Vol. 16. No. 1. Pp. 130-136 (in Ukr.).
3. Zavada O.P., Martyn O.M. (2016). *Klasteryzatsiia shkidnoievropeiskykh krain za yikhnim sotsialno-ekonomichnym potentsialom* [Clustering of Eastern European countries by their socio-economic potential]. *Sotsialno-ekonomichnyi potentsial transkordonnoho spivrobotnytstva: materialy Mizhnarodnoi naukovo-praktychnoi konferentsii* [Socio-economic potential of cross-border cooperation: materials of the International scientific-practical conference]. Lviv. Pp. 59-63 (in Ukr.).
4. Zavada O.P. (2016). *Pokaznyky liudskoho potentsialu ta ekonomichnyi rozvytok krainy: rehionalnyi aspekt* [Human potential indicators and economic development of the country: regional aspect]. *Visnyk Lvivskoho universytetu. Serii ekonomichna* [Bulletin of Lviv University. The series is economic]. Issue 53. Pp. 101-107 (in Ukr.).
5. *Ofitsiyni sait Svitovoho banku* [Official site of the World Bank]. Available at: <http://databank.worldbank.org/data/home.aspx> (Accessed 07 April 2021).
6. *Slovo i dilo. Analitychnyi portal. 22 sichnia 2021 r.* [Word and deed. Analytical portal. January 22, 2021]. Available at: <https://www.slovoidilo.ua/2021/01/22/novyna/ekonomika/ukrayini-skorotylysya-obsyah-promyslovoho-vyrobnytstva-derzhstat> (Accessed 07 April 2021).
7. *Ofitsiyni sait Derzhavnoi sluzhby statystyky Ukrainy* [Official site of the State Statistics Service of Ukraine]. Available at: <http://www.ukrstat.gov.ua> (in Ukr.) (Accessed 09 April 2021).
8. Corruption Perceptions index, 2019. Available at: Retrieved from <https://www.transparency.org/en/cpi/2019/index/nzl> (Accessed 09 April 2021).
9. Bureva N.N. (2007). *Mnomernyi statystycheskyi analiz sypolzovanyem PPP «STATISTICA»* [Multivariate statistical analysis using PPP «STATISTICA»]. Nyzhnyi Novhorod. 112 p.
10. Aivazian S.A., Bukhshtaber V.M., Eniukov Y.S., Meshalkyn L.D. (1989). *Prykladnaia statystyka: klasyfikatsiia i snyzhenye rozmernosti* [Applied statistics: classification and dimensionality reduction]. Moskow, Fyn. y statystyka Publ., 607 p.
11. Yurchyshyn V. *Sotsialno-ekonomichnyi vymir Ukrainy v period zminy politychnykh elit* [Socio-economic dimension of Ukraine in the period of change of political elites]. Kyiv: Razumkov tsentr. 2019. Available at: https://razumkov.org.ua/uploads/article/2019_soc-econ_vymir_ukr.pdf (Accessed 04 April 2021).

Одержано 5.02.2021.