

FINANCIAL AND ECONOMIC ISSUES OF SUSTAINABLE DEVELOPMENT

IMPACTS OF TRADE ON SUSTAINABLE DEVELOPMENT OF UKRAINE'S ECONOMY

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Trade plays an increasingly important role in alleviating regional resource scarcity, facilitating efficient global resource consumption, stimulating economic growth and improving social welfare because transferring goods and services can help not only meet the regional demand but also conserve local (Xu et al., 2020). Also it ensures a balance between production and consumption, the formation of a significant share of gross value added, employment of economically active population (Bilotserkivskyi, 2020). Therefore, it is important to study the impacts of trade on the sustainable development of Ukraine's economy, using methods of cluster analysis.

For this purpose, it is necessary to define homogeneous groups of activities by the number of business entities, persons employed of business entities, employees of business entities, turnover of business entities, and production value of business entities, using methods of cluster analysis.

Cluster analysis includes the following steps (Bilotserkivskyi and Bakadorova, 2021):

1. Build models of cluster analysis using hierarchical (tree-like) methods of cluster analysis.
2. Compare the results of the study according to different rules of association and using different metrics. Construct different types of dendrograms classification. Draw conclusions.
3. Classify objects by the method of K-means, determine the characteristics of the model.
4. Analyze the results of classification for different values of the selected clusters, build graphs, obtain basic statistics, and evaluation of variables according to the obtained models.
5. Draw conclusions and give an economic interpretation of the obtained results of cluster formations.

The software package STATISTICA 12 is used for calculations. The results of calculations are shown in fig. 1-3. In particular, figure 1 shows the dendrogram of the classification by Ward's method. According to this method, objects are joined to clusters in the case of a minimal increase in the intragroup sum of squares of deviations. Due to this, clusters of approximately the same size are formed, which have the shape of hyperspheres.

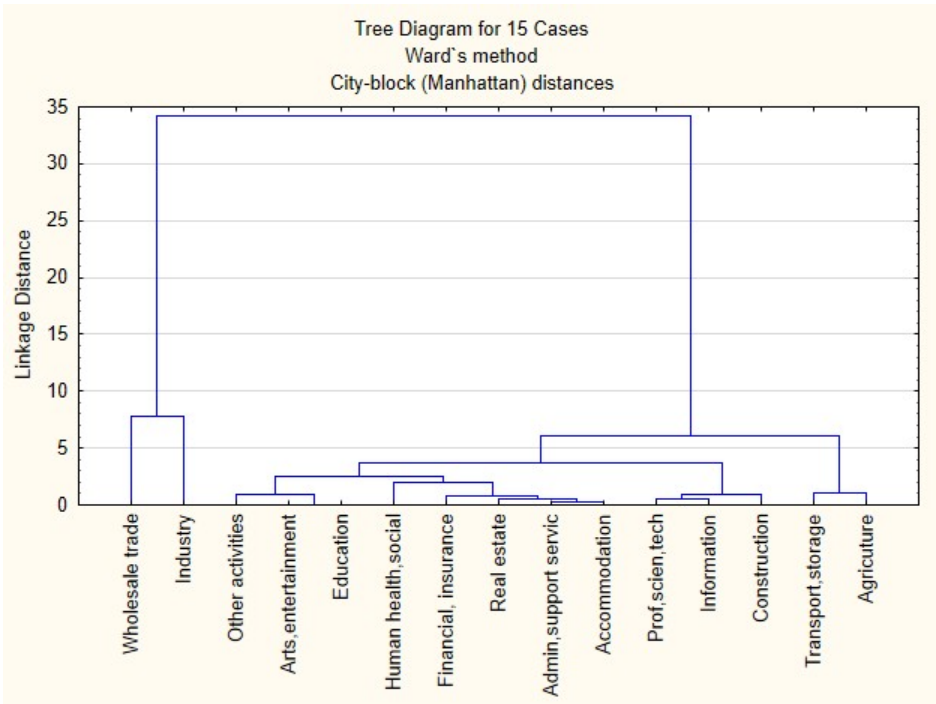


Fig. 1. Dendrogram of object classification

Analysis of this dendrogram in Fig. 1 allows us to recognize three groups (clusters) of homogeneous states in the observed data set.

Let's implement the K-means clustering method.

Plots of means for each cluster are shown in Fig. 2.

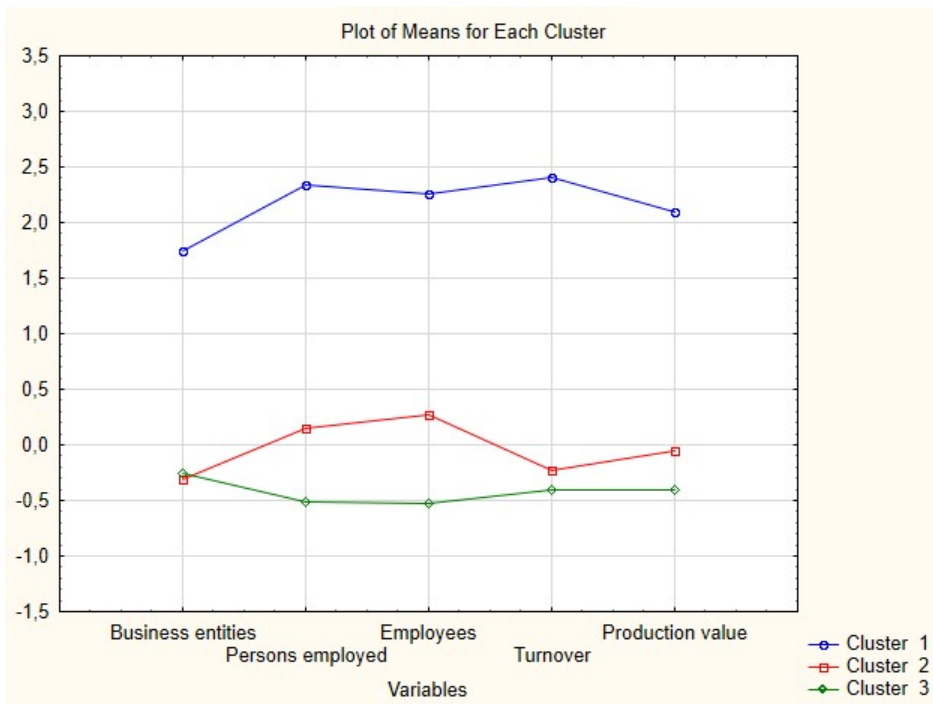


Fig. 2. Plots of mean for each cluster

The members of the clusters and their distances to the center of the corresponding cluster are shown in Fig. 3.

Cluster №1		Cluster №2		Cluster №3	
Members of and Distance	Cluster cont	Members of and Distance	Cluster cont	Members of and Distance	Cluster cont
	Distance		Distance		Distance
Industry	0.981676	Agriculture	0.172623	Construction	0.211363
Wholesale trade	0.981676	Transport, storage	0.208303	Accommodation	0.088776
		Human health, social work	0.266917	Information	0.317834
				Financial, insurance	0.161087
				Real estate	0.048743
				Prof. scien, tech	0.199624
				Admin. support service	0.099846
				Education	0.235299
				Arts, entertainment	0.226992
				Other activities	0.160764

Fig. 3. Cluster members and their distances to the center of the cluster

It is obtained that the cluster №1 (2 industries: industry; wholesale and retail trade, repair of motor vehicles and motorcycles) is characterized by the highest level of performance. The cluster №2 (3 industries: agriculture, forestry and fishing; transportation and storage; human health and social work activities) is characterized by

average values. The cluster №3 (10 industries: construction; accommodation and food service activities; information and communication; financial and insurance activities; real estate activities; professional, scientific and technical activities; administrative and support service activities; education; arts, entertainment and recreation; other service activities) is characterized by the lowest level of indicators.

Thus, the results of the cluster analysis show that in 2019, trade with industry had the greatest impact on the sustainable development of Ukraine's economy, because they were leaders in the number of business entities, persons employed of business entities and employees of business entities, as well as turnover and production value of business entities. This is consistent with the preliminary results of the author, obtained when calculating the indices of the level of district specialization of industries by region of Ukraine (Bilotserkivskiy, 2019).

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