

IDENTIFICATION OF CLUSTERIZATION POTENTIAL AT REGIONAL LEVEL AND IN INDUSTRIAL SECTOR IN THE REPUBLIC OF MOLDOVA

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Despite the fact that in Moldova there are some premises that stimulate various forms of cooperation between enterprises (predominance of small and medium sized enterprises in the total number of enterprises, the relatively high geographic concentration of businesses location; the existence of quite effective business associations) the process of creating clusters in Moldova has not yet obtained a necessary development. The purpose of the article is to identify those industries with potential for creating clusters in the regions of Moldova aiming at developing the cluster state policy. The identification of "agglomerations" is based on the "three stars" methodology developed and utilized by the European Cluster Observatory for mapping and assessing clusters. The basis of this paper is constituted of interim results of a study under the project for the young researchers "The analysis of the clusterization potential in the industrial sector in the Republic of Moldova" (code 16.80012.08.15A).

Keywords: *economic agglomeration, cluster, enterprise, industrial sector, the Republic of Moldova.*

Cu toate că în Republica Moldova există unele premise care stimulează diferite forme de cooperare a întreprinderilor (predominanța întreprinderilor mici și mijlocii în numărul total de întreprinderi; gradul relativ înalt de concentrare geografică a amplasării întreprinderilor; existența asociațiilor de afaceri destul de eficiente), procesul de creare a clusterelor nu a obținut încă o dezvoltare necesară. Scopul articolului constă în identificarea acelor ramuri industriale cu potențial pentru crearea clusterelor la nivelul regional al Republicii Moldova, care ar putea sta la baza dezvoltării politicii statului în domeniul clusterial. Identificarea aglomerărilor economice de tip cluster a fost efectuată prin abordarea de tip „3 stele”, frecvent utilizată în studiile de cartografiere a clusterelor din țările Uniunii Europene. La baza acestui articol stau rezultatele intermediare ale unui studiu realizat în cadrul proiectului pentru tinerii cercetători „Analiza potențialului de clusterizare în Republica Moldova la nivelul sectorului industrial” (cu cifra 16.80012.08.15A).

Cuvinte-cheie: *aglomerare economică, cluster, întreprindere, sector industrial, Republica Moldova.*

Несмотря на то, что в Молдове есть некоторые предпосылки, которые стимулируют различные формы кооперации предприятий (преобладание малых и средних предприятий в общем количестве предприятий, относительно высокий уровень географической концентрации бизнеса; существование эффективных бизнес ассоциаций) процесс создания кластеров в Молдове до сих пор не получил должного развития. Цель статьи состоит в том, чтобы определить те промышленные отрасли с потенциалом для создания кластеров в регионах Молдовы, которые могут стать основой для разработки государственной кластерной политики. Идентификация агломераций проводилась в соответствии с методом «3 звезды», обычно используемым в исследованиях картирования кластеров в странах ЕС. Основой данной статьи являются промежуточные результаты исследования, проведенного в рамках проекта молодых исследователей «Анализ потенциала кластеризации в Республике Молдова на уровне промышленного сектора» (шифр 16.80012.08.15A).

Ключевые слова: *экономическая агломерация, кластер, предприятия, промышленный сектор, Молдова.*

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Introduction. Identification of economic clusters can be achieved by various methods, with no single method and a widely accepted opinion regarding the main variables to be taken into account in determining the geographical boundaries of the clusters [5]. The methods of cluster investigation involve a degree of spatial concentration of the industry in the region.

The specialized literature describes the concentration by measuring the spatial division of labor or industrial specialization [1; 4]. The identification of the spatial inequalities and concentrations of a phenomenon can be carried out by a number of statistical methods, such as the localization coefficient, Herfindahl index used for measuring industrial concentration, the Gini coefficient, which describes the spatial concentration, etc.

According to the cluster development theory there are two approaches of recognizing and developing clusters: the "top down" and "bottom up" approaches. The "top down" approach focuses on developing those priority sectors of industrial and regional development policy of the country or region. In these circumstances, the clusters can be valuable in coordinating and providing initiatives to a particular sector. Clusters of "bottom up" approach are identified through statistical and data analysis using a methodology such as analysis of location coefficient, method known as "three stars" approach [2]. *In this paper, in order to identify the economic agglomerations the method of "three stars" was used.*

The main considerations. The „three stars” approach for cluster identification is a standard methodology used in all EU Member States. The groups / industrial agglomerations are classified in terms of a rating scale which takes values from 0 (minimum) to 3 (maximum) stars. The analysis factors are: size, concentration, specialization (the location quotient).

What are those commonly used limits to assign a star to an agglomeration? The specialized literature does not provide any standard measure for this issue. For example, some studies determine a threshold value for each criterion (size, concentration and specialization). A sector that exceeds the threshold value for any of these indicators is given a star.

In the methodology proposed by the European Cluster Observatory, the author of the research introduced some changes regarding the minimum level for indicators of size, concentration and minimum number of employees in the sector, given that the data applied by the European Cluster Observatory are excessively high for the Republic of Moldova. In table 1, the authors present the criteria for clusters identification adjusted to the Republic of Moldova.

Table 1

Criteria for identifying economic agglomerations

Criteria	Significance	The threshold value	
		Regional level	District level
Size *	The indicator analyzes the capacity of industrial sector to occupy workforce. Is calculated as the share of employees in the analyzed industrial sector against total employment for that sector within Moldova	>7%	>7%
Concentration **	Calculated as the share of employees of an industry in a region in total employment in that region	>2.5%	>2.5%
Specialization ***	This indicator shows the extent to which the industry is considered to have a high degree of specialization in a particular region and represents the combination of Size and Concentration indicators		
<i>The minimum number of employees in an economic sector</i>		700	400
<i>The minimum number of enterprises in an economic sector</i>		3	3
The level of sectorial aggregation	CAEM rev 2 (Classification of Economic Activities of Moldova)	CAEM rev 2 by groups (3 digits)	

Source: Elaborated by the author according to [2; 3].

This article used the term **agglomeration** in the sense of *geographical concentration of companies operating in identical or similar sectors in a certain geographical area.*

The three-stars agglomeration mapping process was carried out at the regional level (North,

Center, South and ATU Gagauzia), Chisinau municipality, and in each district on the basis of CAEM rev. 2 (Classification of Economic Activities of Moldova) by groups (3 digits) (2014).

According to the calculations, at **the regional level** (North, Center, South, ATU Gagauzia) and Chisinau mun., 50 economic agglomerations were identified (10 of three-stars, 1 of two-stars, 39 one-star agglomeration).

At the regional level, the identified agglomerations of three and two-stars are concentrated in the following sectors: manufacture of wearing apparel, except fur (C141), manufacture of wires and cables; manufacture of connecting devices (C273), manufacture of bakery and pastry (C107), beverage manufacturing (C110), manufacture of other textiles (C139).

In **Chisinau mun.** 24 clusters of one-star were identified, within which are concentrated a large number of businesses and employees from various industrial sectors: C141 – manufacture of wearing apparel, except fur (39.4% of total workers of the republic employed in this sector), C107 – manufacture of bakery and pasta products (52%), C110 – manufacture of beverages (36%), C310 – manufacture of furniture (75.3%), C222 – manufacture of plastic articles (73.7%), C331 – repair of metal products, machinery and equipment (74.3%). These sectors have achieved one-star, because exceed the 7% threshold, but cannot be described as clusters of three-stars, given that do not represent more than 2.5% of workers employed in Chisinau mun.

Table 2

**Economic agglomerations identified in Chisinau municipality
(based on CAEM rev.2 by groups) (3 digits)**

Industry branches	Number of enterprises	Number of employees	Share of employees in total employees in sector at national level, %
1 * (one-star)			
C101 - Production, processing and preservation of meat and meat products	43	1567	41.8
C103 - Processing and preservation of fruits and vegetables	53	1341	43.1
C105 - Manufacture of dairy products	12	1605	41.4
C107 - Manufacture of bakery and pastry	112	4426	52
C108 - Manufacture of other food products	54	1692	53.8
C110 - Manufacture of beverages	81	3433	36
C141 - Manufacture of wearing apparel, except fur	211	5699	39.4
C151 - Tanning and dressing of leather; manufacture of luggage, handbags, saddlery and harness; preparation and dyeing fur	15	912	91.8
C152 - Manufacture of footwear	35	1674	64.3
C172 - Manufacture of paper and paperboard	93	1216	87.8
C181 - Printing and service activities related to printing	134	1216	87
C203 - Manufacture of paints, varnishes, printing ink and mastics	5	1204	96.2
C222 - Manufacture of plastic products	198	2744	73.7
C231 - Manufacture of glass and glass products	33	1219	85.4
C236 - Manufacture of articles of cement and plaster	118	1277	57.3
C251 - Manufacture of metal constructions	167	996	75.5
C265 - Manufacture of measuring, testing and navigation; production of watches	12	1404	84.9
C281 - Manufacture of machinery and equipment for general use	6	797	89.6
C310 - Manufacture of furniture	250	3246	75.3
C331 - Repair of fabricated metal products, machinery and equipment	148	1739	74.3
D351 - Generation, transmission and distribution of electricity	48	3247	59.9
D352 - Manufacture of gas; distribution of gaseous fuels through pipelines	6	1266	26
D353 - Steam and air conditioning supply	6	1359	62.6
E360 - Collection, purification and distribution of water	5	1862	33.4

Source: Elaborated by the author based on summarized financial reports provided upon request by the National Bureau of Statistics.

In the **North region**, based on CAEM by groups 2 agglomerations of three-stars were identified, which employ a total of 8.3% employees in the region and 8 one-star agglomerations, employing 12.5% employees in the region.

In the North region, three-stars agglomerations were identified in the following sectors: manufacture of wearing apparel, except fur (C141) and manufacture of wires and cables (C273).

Also several agglomerations of one-star were identified, indicating the fact that in the North region there is a potential for clustering, mainly in the following industries: manufacture of vegetable and animal oils and fats (C104), manufacture of dairy products (C105), manufacture of bakery and pastry (C107), manufacture of other food products (C108), and manufacture of beverages (C110).

Having a relatively developed industrial potential, in the North region operate industrial enterprises in the following sectors: production of dairy products (JSC "Incomlac", JSC "JLC"), materials construction (JSC "CMC-KNAUF"), production of sausages (JSC "Bassarabia Nord", JSC "SoroMeteor"), manufacture of glass, manufacture of wearing apparel (JSC "Mioara", "Rada"), footwear, wood processing, production of rubber and plastic, oil extraction (JSC "Sunflower"), etc.

Table 3

**Economic agglomerations identified in the North region
(based on CAEM rev.2 groups) (3 digits)**

Industry branches	Number of enterprises	Number of employees
1* (one star)		
C104 - Manufacture of vegetable and animal oil and fats	20	746
C105 - Manufacture of dairy products	11	1830
C107 - Manufacture of bakery and pastry	64	1261
C108 - Manufacture of other food products	10	1360
C110 - Manufacture of beverages	19	972
D351 - Generation, transmission and distribution of electricity	4	2166
D352 - Manufacture of gas; distribution of gaseous fuels through pipelines	6	1135
E360 - Collection, purification and distribution of water	50	1419
3*** (three stars)		
C141 - Manufacture of wearing apparel, except fur	53	4769
C273 - Manufacture of wires and cables; manufacture of connection devices	3	2506

Source: Elaborated by the author based on summarized financial reports provided upon request by the NBS.

In the **Centre region** three agglomerations of three-stars were identified, which employ 8% of total employees in the Central region and 6 agglomerations of one-star, employing 10% of employees in the region. In the Central region economic agglomerations of three-stars were identified in the following sectors: manufacture of bakery and pastry (C107), manufacture of beverages (C110), manufacture of other textiles articles (C139). Also, agglomerations of one-star were identified in the following sectors: extraction of stone, sand and clay (B081), production, processing and preservation of meat and meat products (C101), fruits and vegetables processing (C103), manufacture of wearing apparel, except fur (C141).

Table 4

**Economic agglomerations identified in the Center region
(based on CAEM rev.2 groups) (3 digits)**

Industry branches	Number of enterprises	Number of employees
1* (one star)		
B081 - Extraction of stone, sand and clay	45	991
C101 - Production, processing and preservation of meat and meat products	39	1388
C103 - Processing and preservation of fruits and vegetables	71	828
C141 - Manufacture of wearing apparel, except fur	64	1777
D352 - Manufacture of gas; distribution of gaseous fuels through pipelines	4	1248
E360 - Collection, purification and distribution of water	105	1202
3*** (three stars)		
C107 - Manufacture of bakery and pastry	92	1824
C110 - Manufacture of beverages	69	2208
C139 - Manufacture of other textiles	9	1839

Source: Elaborated by the author based on summarized financial reports provided upon request by the National Bureau of Statistics.

In the **South region**, based on CAEM by groups 3 agglomerations of three-stars were identified, which employ a total of 12.1% of employees in the region, one agglomeration of two-stars, which employ a total of 3.1% of employees in the region and one-star agglomeration.

The findings have indicated that in the South region there is a potential for clustering mainly in the following industries: manufacturing of wearing apparel, except fur (C141), manufacture of bakery and pastry (C107), manufacture of beverages (C110).

Enterprises from the South region are specialized mainly in the production of wines and divines. Among the most recognized wineries in the South region are: Purcari, Stefan-Voda, Ciulai Taracalia, Bassarabia L-Win Invest, Basarabeasca, Imperial Vin and Ampelos. Among the largest producers of divine in the region can be highlighted: the Winery "Zolotoi Aist" from Tvardita, Taracalia [6].

Table 5

**Economic agglomerations identified in the South region
(based on CAEM rev.2 groups) (3 digits)**

Industry branches	Number of enterprises	Number of employees
1* (one star)		
E360 - Collection, purification and distribution of water	54	745
2** (two stars)		
C141 - Manufacture of wearing apparel, except fur	12	949
3*** (three stars)		
C107 - Manufacture of bakery and pastry	23	896
C110 - Manufacture of beverages	41	1949
D352 - Manufacture of gas; distribution of gaseous fuels through pipelines	4	833

Source: Elaborated by the author based on summarized financial reports provided upon request by the National Bureau of Statistics.

In **ATU Gagauzia** 2 agglomerations of three-stars were identified, which employ 15.1% of the employees in the region and are concentrated in the manufacture of beverages industry (C110) and manufacture of wearing apparel, except fur (C141).

Table 6

**Economic agglomerations identified in the ATU Gagauzia
(based on CAEM rev.2 groups) (3 digits)**

Industry branches	Number of enterprises	Number of employees
3*** (three stars)		
C110 - Manufacture of beverages	22	962
C141 - Manufacture of wearing apparel, except fur C110	6	1288

Source: Elaborated by the author based on summarized financial reports provided upon request by the National Bureau of Statistics.

At the district level, the mapping process based on "3 stars" method has allowed the identification of 12 economic agglomerations (6 agglomerations of three-stars, 5 agglomerations of two-stars, and one-star agglomeration).

At the district level, the three-stars and two-stars agglomerations are concentrated in Balti municipality and the following districts: Soroca, Anenii Noi, Criuleni, Ungheni, Ialoveni, Criuleni, Orhei, Cantemir, Taraclia.

Thus, in Balti there are concentrated the following industrial sectors: manufacture of dairy products (C105), manufacture of wearing apparel, except fur (C141). Soroca district is specialized mainly in fruits and vegetables processing and preservation (C103) and manufacture of wearing apparel, except fur (C141). Anenii Noi and Criuleni districts are specialized in the production, processing and preservation of meat and meat products (C101).

Manufacture of beverages (C110) is concentrated in Ialoveni, Cantemir and Taraclia districts and Orhei districts is specialized in the manufacture of bakery and pastry (C107).

Table 7

**Distribution of 3, 2, 1 stars agglomerations by districts
and types of activity according to CAEM rev.2 groups (3 digits)**

Industry branches	Number of enterprises	Number of employees	Number of stars
			3***
Balti			
C105 - Manufacture of dairy products	3	859	***
C141 - Manufacture of wearing apparel, except fur	31	2747	***
Soroca			
C103 - Processing and preservation of fruits and vegetables	3	547	***
Anenii Noi			
C101 - Production, processing and preservation of meat and meat products	6	563	***
Criuleni			
C101 - Production, processing and preservation of meat and meat products	6	538	***
Ungheni			
C139 - Manufacture of other textiles	3	1693	***
			2**
Soroca			
C141 - Manufacture of wearing apparel, except fur	8	695	**
Ialoveni			
C110 - Manufacture of beverages	16	558	**
Orhei			

Industry branches	Number of enterprises	Number of employees	Number of stars
C107 - Manufacture of bakery and pastry	13	572	**
Cantemir			
C110 - Manufacture of beverages	4	403	**
Taraclia			
C110 - Manufacture of beverages	9	484	**
			1*
Balti			
C104 - Manufacture of vegetable and animals oils and fats	3	646	*
Total agglomerations 3***			6
Total agglomerations 2**			5
Total agglomerations 1*			1

Source: Elaborated by the author based on summarized financial reports provided upon request by the National Bureau of Statistics.

Conclusions and recommendations. There is a large variety of quantitative methods for identifying economic clusters, but there is no single method and a widely accepted opinion regarding the main variables to be taken into account in determining the geographical boundaries of the clusters. Cluster investigation methods involve investigating the level of spatial concentration of an economic sector in that region.

The statistical analysis for the three-stars mapping process led to the identification at the regional and district levels of several industries which have a higher degree of specialization. Among them can be highlighted:

- *manufacture of wearing apparel, except fur (C141)* with a number of 4769 employees and 53 businesses in the *North region*, 949 employees and 12 businesses in the *South region*, 1288 employees and 6 enterprises in *ATU Gagauzia*;

- *manufacture of wire and cable; manufacture of connection to them (C273)* with approximately 2506 employees and three businesses in the *North region*;

- *manufacture of bakery and pastry (C107)* with 1824 employees and 92 enterprises in the *Central region* and 896 employees in 23 companies in the *South region*;

- *manufacture of beverages (C110)* with 2208 employees and 69 businesses in the *Centre region*, 1949 employees and 41 businesses in the *South region* and 962 employees and 22 businesses in *ATU Gagauzia*;

- *manufacture of other textiles (C139)* with a total amount of 1839 employees and 9 enterprises in the *Central region*.

At the **district level**, based on CAEM by groups (3 digits) three and two-stars agglomeration were identified in the following sectors:

- *manufacture of dairy products (C105)* in *Balti municipality* with a number of 3 companies, in which activate 859 employees;

- *manufacture of wearing apparel, except fur (C141)* in *Balti* (31 companies and 2747 employees) and *Soroca district* (8 companies and 695 employees);

- *production, processing and preservation of meat and meat products (C101)* in *Anenii Noi district* (6 enterprises and 563 employees) and *Criuleni district* (6 enterprises and 538 employees);

- *manufacture of other textiles (C139)* in *Ungheni district* in which operate 3 companies and 1693 employees;

- *manufacture of beverages (C110)* in *Ialoveni district* (16 businesses and 558 employees), *Cantemir district* (4 enterprises and 403 employees) and *Taraclia district* (9 companies and 484 employees);

- *manufacture of bakery and pastry (C107)* in *Orhei district* (13 businesses and 572 employees).

Although the mapping process based on statistical analysis is an important tool for identifying

clusters, however it is not enough. In order to validate the statistical findings and eventually supplementing them with new results, there is a need in qualitative information that cannot be obtained from the analysis of statistical data. The necessary information can be collected mainly through interviews with potential cluster actors (local government bodies, businesses, etc.), as well as through questionnaires.

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