

Formation of Export Clusters in Food Trade of the Russian Federation in the Conditions of Digital Transformation of the Economy

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Abstract—A set of indicators for the needs of targeting in the state programs of agricultural export development and food security is suggested. In the situation when the state authorities set as the purpose to stimulate the export potential at the level of territorial subjects of the Russian Federation, it should be estimated as export of other regions, except for the specified export cluster. The same manner it is possible to regard the shipped goods. The tasks of cluster analysis were solved using the R language in the RStudio graphics platform. As a result, the tendencies for clustering can be determined automatically based on dynamically provided data. As a result, opportunities of information technologies usage, such as big data processing and modern methods of the business analysis allow to set accurately the purposes of state programs and to solve business economic problems more efficiently and effectively.

I. INTRODUCTION

The state program of agriculture development and regulation of agricultural products, raw materials and food markets for 2013 – 2020 [1] describes activities for export development in the separate subprogramme. The target is expressed as export volume in monetary terms. In 2017 the Ministry of Agriculture of the Russian Federation approved some programs of increase in export [2]. Here indicators of efficiency like "export potential in value" and "export potential by the commodities" are present. They represent volumes of the shipped products in monetary and physical units and the indication of the countries of destination. The aim formulated by this way can be reached by efforts of certain exporters, while the bulk of territorial subjects of the Russian Federation are left "behind a globalization board". As strategic planning in Russia was formed, first of all, on the basis of a number of strategies at the regional, but not federal level [3], regional programs as it seems, can use more various criteria of efficiency. Regional variety is present in one dimension: the planned export volumes are specified on types of goods. Example is the program of Tula region [4].

Economic efficiency of export at the level of enterprises is based on the assessment of the production and sales costs [5] which does not make big sense as an indicator of the state program. On the other hand, the export competition as end in itself is "a dangerous obsession", according to P. Krugman [6]. In this regard we will assume that the state seeking to develop export cares for industrial and agricultural development of the territories, including less successful of them.

The existing and new digital technologies, such as artificial intelligence, machine learning, big data and possibility of data combination can help to increase quality of the decisions made in the field of economic policy and management of digital agriculture. As Olga Pisareva specifies, the development and application of mathematical methods and models for the analysis and justification of strategic decisions is a problem of strategic planning [7]. In the literature two scientific directions of assessment of the efficiency of functioning of the complex social and economic objects and systems are under discussion: 1) the formation of indicators set, providing systemacy and details of assessment; 2) creation of the integrated criterion, providing comparability and informational content of assessment [8]. Formation of export indicators taking into account territorial variety of the Russian Federation is our task in this article.

We consider information and the ability of its analytical processing as a basis for adaptation of state mechanism to the quickly changing digital environment [9]. We have already made efforts on theoretical justification of export potential of territorial subjects of the Russian Federation. In particular, with the help of the method of the regression analysis the factors influencing export were established. Depending on the geographical location of a region, factors were subdivided into global and glocal. It was revealed a main influence of the global factors on the regional export, given that global factors describe a position of the Russian Federation in the world market in general, but not the position of its subjects [10]. It is established, on the example of grain export, that regional export at comparison with a country as a whole is more vulnerable because of high concentration [11]. The formation of the regional clusters having the export potential has to become the next stage of work.

Most of resources presented in References are available in Russian.

II. OBJECTS AND RESEARCH METHODS

The objects of analysis were federal districts (FD) and subjects of the Russian Federation. The export and in-Russia trade of eight main types of food were considered: meat, sausages, cheeses, butter, vegetable oil, sugar, flour and groats. The transportation of these types of food products by manufacturing organizations and wholesale organizations from

constituent entities of the Russian Federation in 2016 was obtained from the data of Rosstat “Regions of Russia”. Exported volumes were considered as movement between the subjects of the Russian Federation. Regional export is presented in a separate table of Rosstat, but it is not divided into commodity groups. In this regard, export data was obtained from customs statistics by summing up the export quantities in tons from each subject of the Russian Federation to all countries of destination. The data was requested as follows: for meat - by group 02 of Harmonized System (HS), for sausage products - by heading 1601 of HS, for cheese and cheese products - by heading 0406, for butter - 0405, for vegetable oil shipments on headings 1507-1515 were summed, for sugar - 1701, for flour - 1101 and 1102, for cereal groats - 1103. The year 2016 was chosen as the last year available for analysis, the information on which has already been adjusted by the customs and statistical services. General export patterns were established and cluster analysis was conducted.

The tendency to clustering was determined using the Hopkins criterion. Hopkins statistics is one of the possible indicators of the tendency to clustering. For its calculation, B pseudo sets of data is generated randomly, it is based on the distribution with the same standard deviation as the original data set. For each observation i from n , the average distance to k nearest neighbors is calculated: w_i between real objects and q_i between artificial objects and their closest real neighbors.

Then the Hopkins statistics (formula 1), exceeding 0.5, will correspond to the null hypothesis that q_i and w_i are similar, and the objects to be grouped are distributed randomly and uniformly.

$$H = \sum_n w_i / \left(\sum_n q_i + \sum_n w_i \right) \quad (1)$$

$H < 0.25$ at a 90% level of confidence indicates a tendency to group data.

For the cluster analysis solution, the k-means method was chosen, based on dividing objects into a previously known number of clusters and minimizing the distances between clusters centers and all its objects. The method choosing is determined by its popularity and implementation in many analytical applications. For the number of clusters detecting, the “elbow” method, allows analyzing the speed’s decreasing variance within cluster and the method of quality assessment, based on the silhouette index value, that allows comparison the distances between objects in clusters with distances to objects in other clusters were chosen. Because the formed clusters initial centers can be generated randomly for each solution of the cluster analysis, the results can be different. For compensation this deficiency, a sample with the average values was formed by using the Monte Carlo method.

The tasks of cluster analysis were solved using the R language in the RStudio graphics platform. The choice is based on the fact that this tool, according to analysts, is one of the best in solving processing problems. A large number of functions of cluster analysis and visualization of clustering results are implemented in the language. The cluster analysis

libraries have functions for assessing the quality of the results obtained.

The task of clustering federal districts of Russia is divided into three independent tasks:

- 1) Clustering FD for the export of food abroad.
- 2) Clustering FD on the shipment of food to other subjects of the Russian Federation.
- 3) Clustering FD by the total volume of export of food.

Similar tasks were also set for the subjects of the Russian Federation.

III. RESULTS

General patterns of export of the main types of food products by region of destination are presented in Table I.

TABLE I. EXPORTS IN THIS DIRECTION AS A SHARE OF TOTAL EXPORTS, %

the main types of food products	Europe and Central Asia		East Asia and the Pacific	Latin America and the Caribbean	North America	Middle East and North Africa	South Asia	Sub-Saharan Africa
	total	To Eurasian Union						
Meat	63	31	34	0	0	2	0	2
Sausage	100	78	0	0	0	0	0	0
Cheese	99	62	1	0	0	0	0	0
Butter	98	50	1	0	0	1	0	0
Vegetable oil	58	11	9	0	0	29,5	1,5	2
Sugar	95,2	49	1,3	0	0,1	0	3,4	0
Flour	43,1	13	38,4	0,4	0,2	17,9	0	0
Groats	80	46	16	0	2	2	0	0

Based on the Table I we can conclude that Russia is represented on the global market just with two products - vegetable oil and flour (partly groats). Export of other groups is concentrated in the region of Europe and Central Asia.

A. Comparative Analysis of Exports and Shipments Between the Subjects of the Russian Federation

The correlation between export and domestic shipments is significant at the 0.05 significance level. The value of the pair Pearson correlation coefficient is 0.27, which indicates a small correlation. Thus, if we assume that the export volume depends on the volume of production of goods, then the export volumes are subject to a different pattern, and some regions are exporters in the absence of movement between the subjects of the Russian Federation. The histogram of the distribution of the share of exports in the total traffic volume is shown in Fig.1.

The histogram shows that the share of exports abroad compared with the shipment of food to other regions of Russia is small. The average of fraction is 0.21 with a standard deviation of 0.29.

When constructing clusters from FD the following importance of variables according to the degree of their influence on the formation of clusters was obtained (Table II).

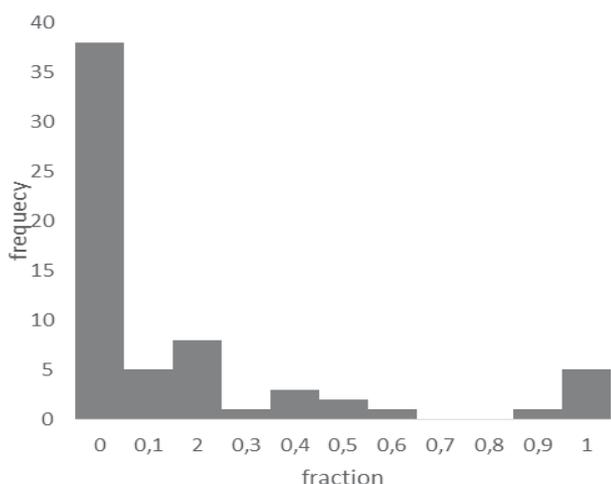


Fig.1. Histogram of the distribution of the share of exports in total traffic

TABLE II. THE IMPORTANCE OF INDIVIDUAL VARIABLES FOR BUILDING CLUSTERS

Variables	Export	In-Russia shipment	Total	Average
Meat	0,375	0,514	0,528	0,47
Sausage	0,467	0,537	0,527	0,51
Cheese	0,681	1	0,471	0,72
Butter	0,175	0,375	0,184	0,24
Vegetable oil	0,144	0,298	0,281	0,24
Sugar	1	0,69	1	0,90
Flour	0,113	0,429	0,345	0,30
Groats	0,11	0,227	0,154	0,16

Judging by Table II, sugar, cheese, sausage and meat have the greatest value in clustering. The other four types of goods in this task play a small role.

B. Cluster Analysis by Federal Districts

(1) *Clustering FD on Food Exports:* The following clusters were obtained by solving the problem of cluster analysis using the k-means method for a given number of clusters equal to three. The data in Table III, designating cluster centroids, allows for the interpretation of clusters. In Table III all variables are standardized. Zero means mean. Negative values are below average, positive ones are above average.

The first cluster is the Central District. There are high export volumes for all commodity groups, except for flour. The third cluster also includes one object - the Southern Federal District. This cluster is characterized by export volumes exceeding the average volume in Russia. Especially large export volumes are typical for butter, flour and groats. Finally, the second cluster includes all other federal districts. Export for all analyzed products is below the average for Russia.

TABLE III. CLUSTER CENTROIDS, EXPORT OF FEDERAL DISTRICTS

Cluster number	Meat	Sausage	Cheese	Butter	Vegetable Oil	Sugar	Flour	Groats
1	2,20	2,19	2,41	0,29	0,00	2,31	-0,04	1,05
2	-0,43	-0,47	-0,41	-0,36	-0,30	-0,48	-0,27	-0,37
3	0,41	0,62	0,05	1,87	1,82	0,55	1,68	1,14

To graphically represent the results of solving the cluster analysis problem, the dimension of the variable space has been reduced using the principal component method. The first component (Dim1) describes about 60% of the variability of variables. The second component is more than 19%. Thus, this diagram describes the studied objects with high quality. The distance between the clusters indicates their proximity to each other (Fig. 2). The figure shows that the clusters do not overlap. The distances between them are relatively large, which determines the reliability of the solution of the clustering problem.

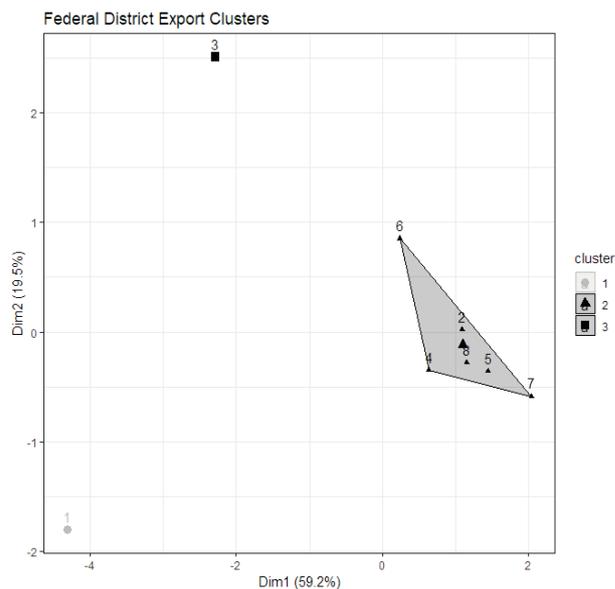


Fig.2. Resonance chart for solving the problem of cluster analysis of food exports from federal districts

Fig. 3 shows the ordination diagram [12] of the analyzed products, built on the result of solving by the method of principal components. The first component accounts for more than 59% of the variability of variables. The second component gives more than 19%. The angle between the vectors corresponding to the product groups shows the correlation between them. The angle between the vectors and the axes of the diagram indicates the correlation between the groups of goods and the principal components. The intensity of the vector determines the importance of the variable. This diagram shows that most of the signs are related to each other with a positive correlation, which suggests that product groups can be grouped into more general groups. Thus, it is possible to solve two classes of cluster analysis problems: the problem of combining regions and the problem of combining variables.

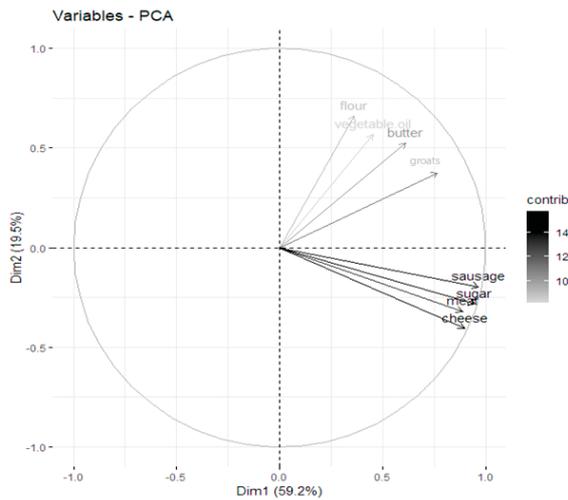


Fig.3. Ordination chart of products when exporting from federal districts

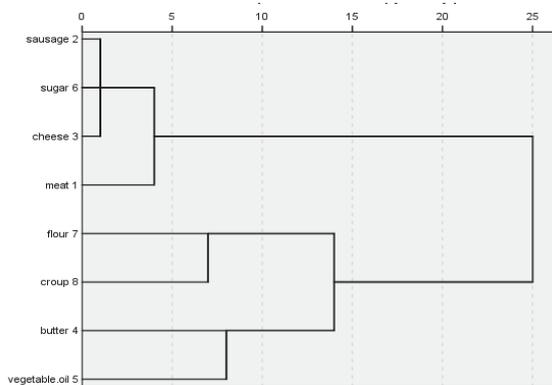


Fig. 4. Dendrogram of products when exporting from federal districts

Judging by the Fig.3 the first component is determined mainly by cheese, sausage, sugar and meat. The second component contains flour and vegetable oil. There is a high correlation between cheese, sausage, sugar and meat, as well as between flour and vegetable oil. The hierarchical dendrogram shown in Fig. 4 confirms this conclusion. Given the Ward method and the Euclidean metric, the closest ones are sausage, sugar and cheese, as well as meat.

(2) *Clustering FD for the Shipment of Food to Other Subjects of the Russian Federation:* When solving a problem in which shipment to other subjects of the Russian Federation is considered, the following distribution of clusters is obtained (Table IV). The first cluster includes the Central FD, which is characterized by a high shipment volume for goods of all groups, except for cereals (medium shipment). The second cluster includes three federal districts: Southern, Volga and Siberian. For these FD, the export of meat, sausages and sugar is less than the average and the relatively large volume of export of groats is determined. The third cluster includes the rest of the federal districts. They are characterized by the smaller than the average volume of export for all groups of commodities. The first cluster is located at a considerable distance from the other two (Fig. 5).

TABLE IV. CLUSTER CENTROIDS, SHIPMENT OF FEDERAL DISTRICTS TO OTHER REGIONS OF RUSSIA

Cluster number	Meat	Sausage	Cheese	Butter	Vegetable oil	Sugar	Flour	Groats
1	2,34	2,35	2,29	1,88	1,59	2,36	2,19	0,40
2	-0,24	-0,22	0,10	0,30	0,43	-0,10	0,00	0,85
3	-0,40	-0,42	-0,65	-0,69	-0,72	-0,52	-0,55	-0,74

To study the importance and interrelationship of commodity groups, an ordination diagram was constructed, which shows the vector of variables, constructed according to the degree of their influence on the first two main components. Judging by the diagrams shown in Fig.5, Fig.6, the first two main components describe more than 90% of the variability of variables. The first main component is almost completely determined by sugar, cheese and flour. There is a very strong correlation between the shipments of sausage and meat, as well as cheese, sugar and butter. Significantly less correlation is observed between vegetable oil and groats.

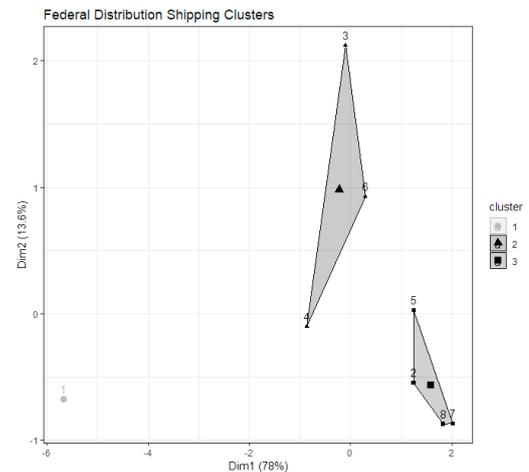


Fig.5. Ordination diagram for solving the problem of cluster analysis of the export of food from federal districts to other subjects of the federation

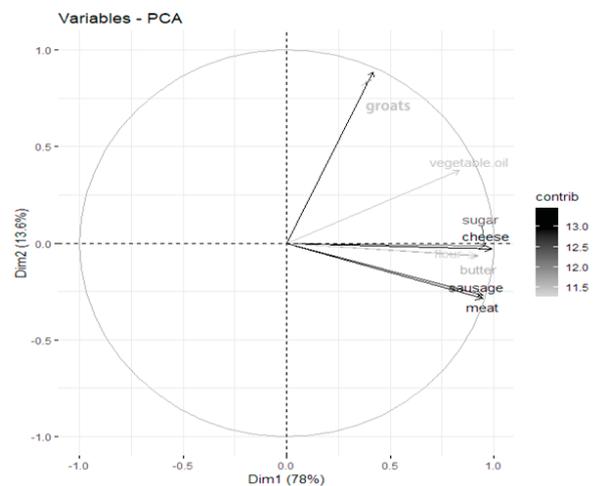


Fig.6. Ordination diagram of groups of products when exporting to other subjects of the federation from federal districts

(3) Clustering FO by Total Export of Food: Centroids obtained by solving the task of the total transportation of products from FD, are given in Table V.

TABLE V. CLUSTER CENTROIDS, TOTAL SHIPMENT OF FEDERAL DISTRICTS FOR EXPORT AND TO OTHER REGIONS OF RUSSIA

Cluster number	Meat	Sausage	Cheese	Butter	Vegetable oil	Sugar	Flour	Groats
1	2,35	2,35	2,31	1,85	0,90	2,36	2,19	0,44
2	-0,41	-0,43	-0,64	-0,71	-0,62	-0,52	-0,55	-0,74
3	-0,25	-0,21	0,08	0,33	0,53	-0,10	0,01	0,84

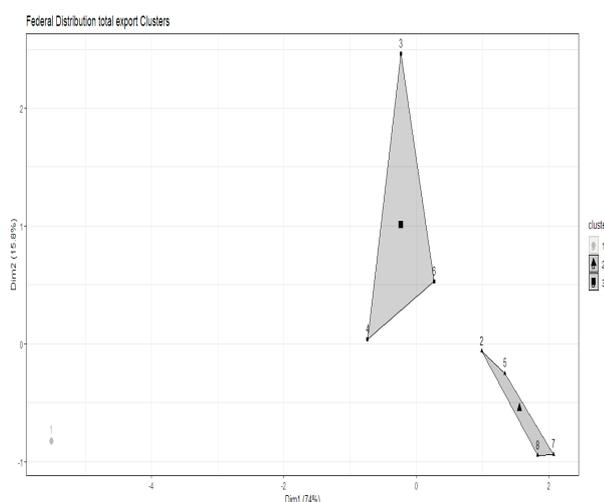


Fig. 7. Ordnation diagram for solving the problem of cluster analysis of the export of food from federal districts for export and to other subjects of the federation

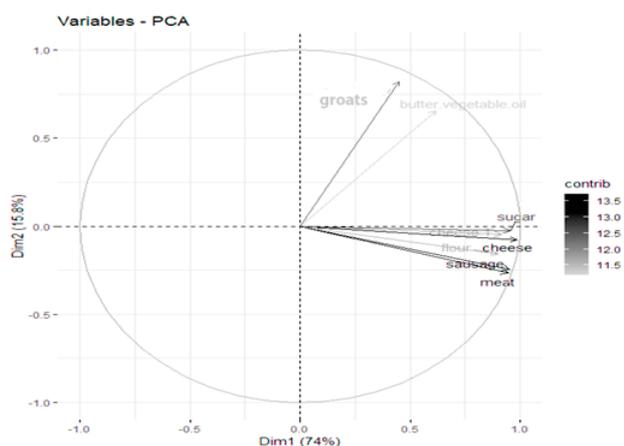


Fig. 8. Ordnation diagram of product groups for export and export to other subjects of the federation from federal districts

The first cluster includes the Central Federal District. The first cluster is characterized by an average volume of export of groats and a high volume of export of all other food products. The second cluster includes the North-Western, Ural, Far Eastern and North-Caucasian Federal Districts. This cluster is characterized by a low volume of export of all food, the least exported are meat and sausages. The third cluster includes the Southern, Volga and Siberian federal districts. The export

volumes are close to the average, they are higher in butter and vegetable oil, and even higher in groats. The first cluster is significantly separated from the other two, as can be seen in the ordination diagram shown in Fig.7. The ordination diagram shown in fig.8 confirms previously formulated conclusions. The shapes of the areas and vectors shown in Fig.7 and Fig. 8 are in many ways similar to diagrams, constructed as a result of analyzing the volumes of shipment of food products to other regions of Russia. This conclusion is confirmed by the fact that the bulk of the export of food falls on the domestic market.

C. Cluster Analysis by Region of the Russian Federation

To solve the problem of clustering the subjects of the federation, we will also solve three tasks: a cluster analysis on exports, on shipments to other constituent entities of the Russian Federation and, in general, on the total export volume. Note that all data sets have a tendency to clustering. The observed values of the Hopkins criterion for each of the three tasks are 0.07, 0.05 and 0.16 respectively. Such small values of the statistical criterion confirm the hypothesis that associations of subjects into clusters are not accidental.

(1) Clustering of Subjects of the Russian Federation for the Export of Food: We solve the problem of determining the number of clusters using the criterion "elbow". To this end, using the graph shown in Fig.9, we analyze the change in the variance within clusters depending on the number of clusters. Obviously, the maximum variance will be when the number of clusters is equal to one. Then this dispersion will decrease with increasing number of clusters. The angle of inclination of a piece of a piecewise-given function indicates the rate of dispersion decrease. On this basis, we determine the number of clusters equal to four. In order to further compare the results of clustering for the other two tasks, we also assume that the number of clusters is four.

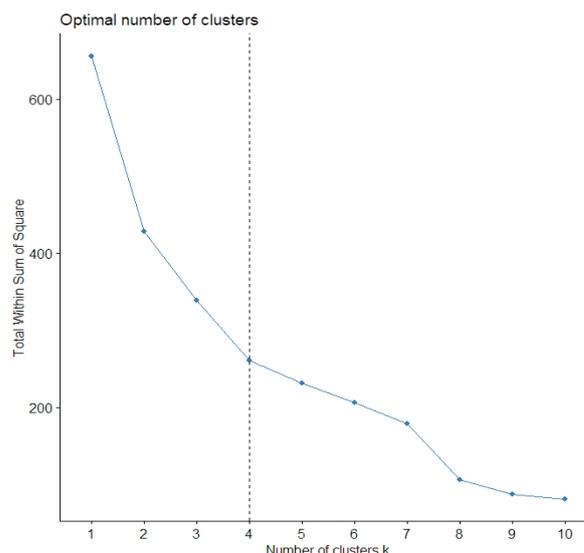


Fig.9. Selection of the optimal number of clusters by the "elbow" method

The cluster centroids obtained by solving the clustering problem are listed in Table VI. Cluster analysis task is solved for four clusters. Two subjects of Russian Federation are in the

first cluster. The second, third and fourth clusters, respectively, include 1, 6 and 74 subjects. Table VI shows the coordinates of the centers of the clusters in a standardized form.

TABLE VI. CLUSTER CENTROIDS, EXPORT OF THE SUBJECTS OF RF

Cluster Number	Meat	Sausage	Cheese	Butter	Vegetable oil	Sugar	Flour	Groats
1	2,88	4,06	4,85	0,09	-0,01	4,85	0,58	1,34
2	-0,27	-0,14	-0,14	-0,17	-0,12	-0,20	-0,29	-0,19
3	3,49	2,47	1,62	6,08	7,01	0,05	4,51	3,87
4	1,82	0,00	0,05	1,10	0,35	0,77	2,59	1,25

The first cluster is characterized mainly by the export of meat, sausage, cheese, sugar and groats, it includes Moscow city and the Moscow region. The second cluster includes most of the regions of Russia. The export volume of all groups of goods of members of this cluster is less than the average in Russia. The third cluster contains only the Rostov region, it is characterized by very high volumes of butter, vegetable oil, meat, sausage, flour and groats export. The fourth cluster is formed by six subjects of the Russian Federation. It includes the Belgorod and Chelyabinsk regions, St. Petersburg, as well as the Krasnodar, Altai and Stavropol krais. It is characterized by very large volumes of export of flour, relatively large volumes of export of meat, cereal groats and butter.

The export volume of all analyzed commodity groups exceeds the average for Russia, except for sausage. To graphically represent the union of objects into clusters, the problem of reducing the dimension of the vector of variables was also solved. The ordination diagram, which shows the distribution of objects into clusters, is shown in Fig.10.

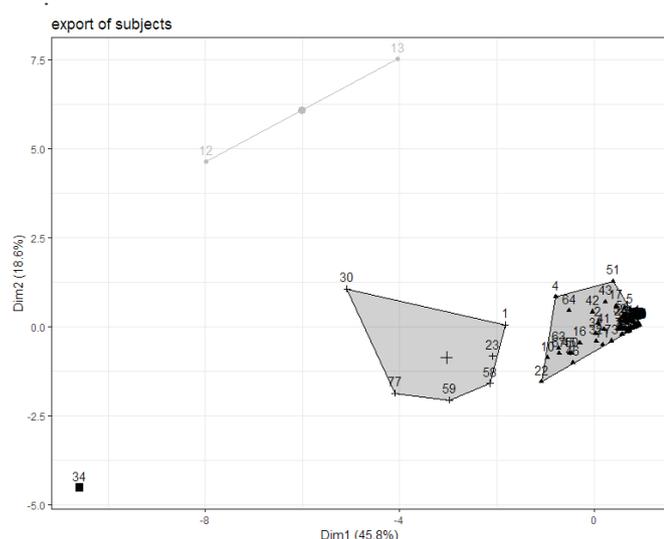


Fig.10. Ordination diagram for solving the problem of cluster analysis of the volume of exports from the subjects of the Russian Federation for a given number of clusters equal to four

Judging by the diagram, the two selected main components (two dimensions of the diagram) explain about 64 percent of

the variability of variables. The decrease in the share of the explained variance compared to the diagrams constructed for the federal districts of Russia is explained by the greater variability of exports for different types of products. Analysis of the matrix of factor loadings, as well as indexes of the contribution of variables to the components, allows us to conclude that vegetable oil, cheese and flour make the greatest contribution to the solution of the problem.

(2) *Clustering of Subjects of the Russian Federation for the Shipment of Food to Other Subjects*: The cluster centroids for this task are listed in Table VII.

TABLE VII. CLUSTER CENTROIDS, SHIPMENT BETWEEN SUBJECTS OF THE RUSSIAN FEDERATION

Cluster number	Meat	Sausage	Cheese	Butter	Vegetable oil	Sugar	Flour	Groats
1	-0,18	-0,10	-0,29	-0,26	-0,19	-0,28	-0,31	-0,21
2	-0,06	7,60	0,17	3,23	-0,35	-0,32	-0,49	-0,32
3	0,34	-0,08	1,19	0,77	0,03	0,69	1,68	0,65
4	2,77	-0,07	1,67	1,65	4,12	3,71	0,43	2,10

The first cluster includes 67 subjects of the Russian Federation. This cluster is characterized by the volume of export of food products of all analyzed categories less than the average shipment in-Russia. The second cluster includes only one subject – the Moscow city. It is characterized by a very large volume of export of sausage, a large volume of export of butter. The volume of export of all other food products is less than the average volume in Russia. The third cluster includes 12 subjects. This cluster is characterized by a large volume of export of flour and cheese. For other products (except sausage), the export volume exceeds the national average. The fourth cluster, which includes Belgorod, Voronezh regions and the Krasnodar krai, is characterized by a very large export of vegetable oil, a large export of cereals, cheese, butter. Fig. 11 shows an ordination diagram distributing the subjects of the Russian Federation across clusters.

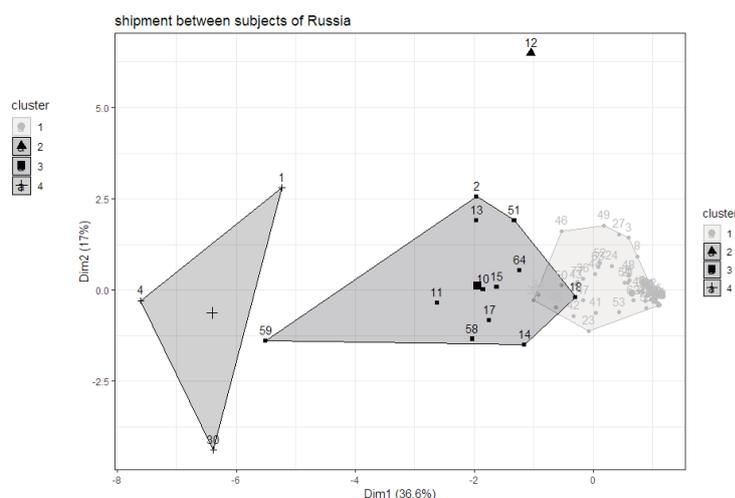


Fig. 11. The ordination diagram for solving the problem of cluster analysis of the volume of shipments between the subjects of the Russian Federation with a given number of clusters equal to four

Judging by the diagram, the clusters intersect. The distance of individual objects of a cluster to the center of another cluster is less than to the center of its cluster. By setting other values of the number of clusters (two, three and five), the quality of clustering improves. In particular, it happens when determining only two clusters, with the number of subjects in the first and second clusters equal to five and seventy-eight, respectively (Fig. 12).

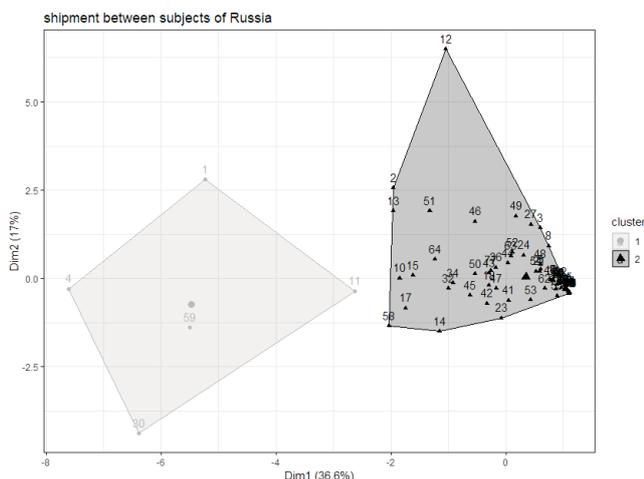


Fig. 12. Ordination diagram for solving the problem of cluster analysis of the shipment volume between the subjects of the Russian Federation for a given number of clusters equal to two

(3) *Clustering of Subjects of the Russian Federation by Total Shipment of Food:* We solve the problem of cluster analysis for four clusters. The first cluster includes sixty-eight subjects of Russia. In the second, third and fourth clusters, respectively, there are two, one and eleven objects. Table VIII shows the coordinates of the cluster centers in a standardized form.

TABLE VIII. CLUSTER CENTROIDS, TOTAL SHIPMENT

Cluster number	Meat	Sausage	Cheese	Butter	Vegetable Oil	Sugar	Flour	Groats
1	-0,19	-0,11	-0,31	-0,26	-0,20	-0,26	-0,31	-0,19
2	0,33	-0,19	2,48	0,94	5,19	4,14	0,21	3,19
3	-0,08	7,42	1,26	3,04	-0,36	-0,32	-0,52	-0,33
4	1,01	-0,03	1,21	1,04	0,24	0,82	1,58	0,51

The first cluster, in which the majority of the subjects of the federation fell, is characterized by the shipment of all analyzed food products less than the average in Russia. The second cluster includes the Voronezh Region and the Krasnodar krai. For all products analyzed, the total volume of shipment is above the average. A particularly large amount of trade is characteristic for vegetable oil, sugar, as well as for groats and cheese. The third cluster includes only the city of Moscow. This cluster is characterized by a very large shipment of sausage and butter in comparison with others. Finally, the fourth cluster is characterized by a relatively large volume of all food trade, except for sausage. The diagram shown in Fig. 13 as well as the results of cluster analysis, say that accurate within two main components, which were

defined for the graphical representation of the source data, all the clusters do not overlap with each other. Clusters have relatively small within cluster variance. The between cluster variance is larger, which indicates a good separation. Their form and composition do not repeat the form and composition of export and in-Russia shipment clusters.

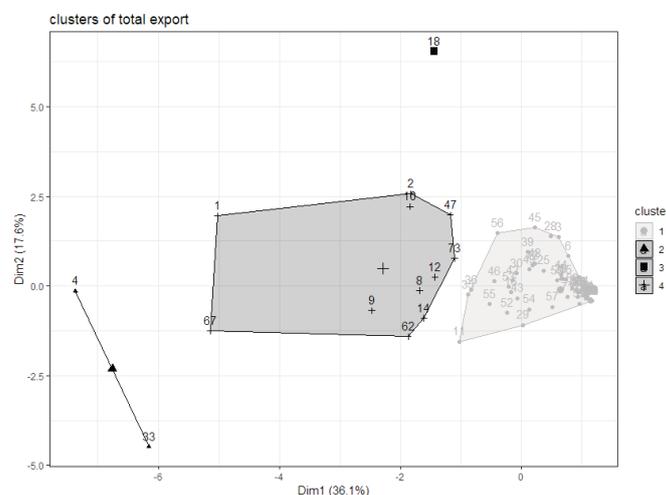


Fig. 13. Ordination diagram for solving the problem of cluster analysis of the total shipment volume of commodities from the subjects of the Russian Federation for a given number of clusters equal to four

It should be noted that many regions do not export certain groups of commodities at all. This leads to the fact that, despite the tendency of observations to clustering, the quality of clustering is not very high.

IV. DISCUSSION

We established that there is a small correlation between the volume of export and volume of a trade between subjects of Russian Federation. It reveals specific features of regions of two types – those who export and are involved in interregional shipment of food products. The effectiveness of methods of the factorial and cluster analysis, convergence of the results received with their use and also the ability of interpretation confirms expediency of their introduction in analytical centers, in the systems of monitoring and forecasting of the export and the food security of Russia.

In the in-Russia movement the Central Federal District is the most active, mainly such parts of it as the Moscow city, the Voronezh and Belgorod regions. In other federal districts there are basic regions providing considerable volumes of deliveries to other subjects. The Krasnodar krai in the Southern Federal District has the greatest trade.

In export, as well as when moving between territorial subjects of the Russian Federation, Central Federal District is the most important. Exporters are the same subjects which were of great importance in in-Russia trade. The Southern Federal District has the same importance in export abroad. The Rostov region has the clear export specialization.

The concept of "cluster" from the point of view of its author – M. Porter - implies proximity of participants. Taking into account this approach, we can say that the territory of Moscow city and the Moscow region constitutes full export

cluster. First, both subjects have border, secondly, they export all four types of the products significant for a clustering as it was shown in this article – meat, sausage, cheese and sugar. In the world market this cluster is significant only for the region of Europe and Central Asia as the specified goods are not delivered worldwide.

At the same time, it would be interesting to reveal an export cluster of global meaning in the Russian Federation. The Rostov region exporting products of the global market (vegetable oil and flour) in very large volumes is the only participant in the cluster. However the Rostov region borders on the Voronezh region, Stavropol krai and Krasnodar krai. The Voronezh region at a clustering on the general shipment is characterized by the high volume of trade of vegetable oil. The Stavropol krai and Krasnodar krai export rather large volumes of other "global" commodity – the flour. The Voronezh region borders with the important exporter – the Belgorod region.

A cluster of a number of the territorial subjects of the Russian Federation within Central Federal District can also have a global export meaning. Taking into account that all listed subjects have the general borders, it is possible to speak about one export cluster.

It is expedient to carry out the generalized analysis of food trade on two groups of goods. In case of export it is 1) flour and vegetable oil; 2) cheese, sugar, meat and sausage. In case of in-Russia trade the players of commodity clusters are changed. They are 1) meat and sausage; 2) sugar, cheese, flour and butter.

V. CONCLUSION

Possibilities of information technologies such as big data and modern methods of the analysis allow to set accurately the purposes of state programs and to solve economic problems more effectively. In application to food trade a set of indicators (regional and commodity clusters) is created for targeting export development.

The existing base of customs statistics on territorial subjects of the Russian Federation is the most detailed, but it gives no opportunity of inquiry results grouping. On the other hand, in customs statistics we have a general figure of agricultural and food export which can't open a picture in details. Between two specified extreme levels there is an intermediate area – clusters – giving additional valuable information on export, without reducing it to details. In this article the criterion is developed, on the basis of which the assessment of the export potential is possible.

Concerning the exporting subjects it is offered to consider separately a cluster which includes:

subjects of Central Federal District: Moscow city, Bryansk, Kursk, Lipetsk, Moscow, Oryol, Ryazan, Tambov, Tula, Belgorod and Voronezh regions;

subjects of the Southern Federal District: Rostov region and Krasnodar krai;

subject of the North Caucasian Federal District: Stavropol krai.

Dynamics in this cluster has the all-Russian meaning. If the public authority sets as the purpose to stimulate the export potential at the level of territorial subjects of the Russian Federation, it should be estimated as export of other regions, except for the specified cluster.

The same way it is possible to regard the shipped goods. Export of flour and vegetable oil demonstrates global presence of Russia in the world markets. These goods can be considered together, because in this work the high correlation between volumes of their export from territorial subjects of the Russian Federation is established. For assessment at the subnational level it is recommended to take together cheese, sausage, sugar and meat also because of high correlation between volumes of export of these goods.

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