

Marketing information for holding leading positions in the market segment of the grain processing enterprises

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Abstract This paper focuses on the marketing information for holding leading positions in the market segment of the grain processing enterprises. We develop and test the contemporary approach to the analysis of the raw material market for marketing needs of the leading grain processing enterprises.

Our results and findings are based on cluster analysis built according to the territorial principle. The stages of preparation and assessment of data are determined. The interpretation of results and comparison with traditional practices are also presented within the scope of the paper. The constructed model allows to find the hidden patterns in the development of priority qualities of potential counterparts taking into account their spatial dispersion. Our results might be of some interests to stakeholders in agricultural policy and regional development as well as to the policy-makers of various sorts.

1 Introduction

A characteristic feature of the marketing theory is the constant consideration of changes in the socio-economic environment. Practice sets new tasks and defines new priorities, while the researchers describe and comprehend events and enrich the scientific and practical arsenal of marketing activities of enterprises. As the economic practice shows, the use of marketing in the procurement activities of grain processing enterprises is paid insufficient attention, which negatively affects the overall results of marketing work.

Knowledge of the laws of behavior of participants in the procurement process and the principles of management of this process becomes an important source of information for developing marketing strategies of the leading enterprises and increasing the effectiveness of their marketing activities. At the same time, the formation of the essence of marketing of raw materials for the leading grain processing enterprises becomes extremely urgent (Oláh et al. 2017).

The initial hypothesis of the study is the assumption that the purchasing marketing of a grain processing enterprise, in contrast to the purchasing activity of a processing enterprise, is an integrator of the factors of the efficiency of the raw complex development, and its functioning is not limited to the formation of a flow of cheap raw materials, but is aimed at the formation of stable supply chains. Therefore, an extremely important role is assigned to assessing the differentiation of the marketing manager's awareness of the leading grain processing enterprise in management decisions regarding the state of the raw material market.

2 Literature review

In the recent years, a plethora of foreign and Ukrainian authors have been devoted to the research of theoretical and methodological questions of branch markets functioning. Relying on the theoretical and methodological foundations of marketing and logistics, which are reflected in the scientific works of well-known scientists in this field, many domestic researchers make attempts to explore individual market segments, as well as to reveal the

patterns of their development and to predict their further prospects (Filipishyna et al. 2018). However, at present foreign and domestic scientists and specialists do not agree on the definition of the essence of marketing research. Thus, some authors have determined that the main marketing tasks on both the consumer and commodity markets in the current economic conditions are closely related to market segmentation (Kovalenko et al. 2010; Tereshchenko et al. 2012; Kazakova and Kolesnik 2012; Janda et al. 2013; Ashmarina and Zotova 2016; Strielkowski and Höschle 2016; Homburg 2016; Niño-Amézquita et al. 2017; Kubeš and Rančák 2018; or Naumov et al. 2018).

Segmentation of the market is the strategy and tactics of producers and sellers of grain and products of its processing on the market, which implies the division of its spheres in time and space into separate segments that are characterized by the same requests of consumers and buyers for certain types of products. Each segment must meet the following conditions: be sufficiently differentiated, be able to take into account the requests of each group of participants, be able to further segment, and finally, the products proposed must be competitive. The most common in practice are the following approaches to segmentation, which create the basis for the study of the situation in the regional raw material market (Moskalenko and Yevsieieva 2015).

Segmentation by demographic principle, according to experts, is the most common type of the market segmentation (Blythe 2003), since it is believed that it is the demographic characteristics of consumers that determine their preferences when choosing a particular product. However, this statement is the most popular one among researchers of consumer goods (Kosterin 2002). Another reason for the wide spread of this approach to segmenting the market is that the demographic parameters of consumers are comparatively easy to classify and quantify, and there is a certain correlation between the demographic characteristics of the consumer, his consumption of the good and demand (Reshetnikova and Zhitko 2007).

Some experts argue that geographic segmentation is advisable if there are climate differences between regions, or differences in the systems of cultural values of the population. The principle of geography of the region emphasizes the main distinctive characteristics of cities, regions and districts. Also, when applying this principle, the main elements of segmentation are considered. These are as follows: the structure of commercial activity; transport network of the region; availability of mass media; dynamics of the development of the region; rate of inflation; certain legal restrictions, etc. (Shalaev 2003).

It is worth noting that in practice, as a rule, a combination of different approaches to segmenting of the market is used, because the application of only one principle of segmentation does not give enterprises full information about the situation in the regional raw material market. Improvement of approaches to the raw material market research as the basis for the sustainable operation of agro-processing enterprises is possible through a multifactor segmentation of the market, the segments of which are formed on the basis of taking into account several variables of segmentation simultaneously. This is where the fundamentals for segmentation should be identified.

The specificity of agricultural products and foodstuffs (perishable goods have the limited selling time) determines the aspiration of commodity producers to the stability of inter-branch relations and the stability of the financial situation as a whole. The main feature of the current stage in the development of the food market is the strengthening of financial constraints, a reduction in budget support for commodity producers, an unfavorable credit and tax environment, and a decrease in the counterparty's solvency (Barilovich 2017; Kolodiychuk 2014; Markina and Al-Shiraf, 2016; Danylenko et. 2017; Natorina 2017; Nikoliuk et al. 2017; Gryshova et al. 2016; or Markina et al. 2018).

The goal of the effective inter-regional grain links is to ensure the society's need for high-quality grain with minimal losses for producers (Melnik 2013; Hauser et al. 2015). Without taking into account the regional peculiarity, it is impossible to determine the optimal variants of location and interregional links and prospects for improving the division of labor based on the interdependence of grain production in various regions of the country.

3 The purpose and methods

The purpose of the article is to reveal the regularities and tendencies of the grain market for the development of leading enterprises in grain processing. For this purpose, it is advisable to implement the conditional classification of agricultural enterprises (in the example of the Poltava region) in order to determine the key features that can be put in the basis of the marketing policy development of a grain processing enterprise for establishing mutually beneficial relations. In order to achieve these goals, the following tasks were defined:

1. Determination of the parameters of segmentation objects – suppliers of grain raw materials – indicators of the activities of agricultural enterprises in the region under investigation, which affect the efficiency of agro-processing enterprises functioning.
2. Determination of the optimal method for complex multifactor segmentation and conducting research on the appropriate methodology.
3. Comparison of the informative value of the research results on the methodology of complex multifactor segmentation and current practice.

When choosing options for links in the market conditions, the territorial differentiation of production costs, prices and tariffs was explored. When comparing possible options for linkages between grain producers and grain processors, only interchangeable options are considered, ensuring the delivery of the same quality, volumes and types. For each variant, factors that affect the increase or decrease in the effectiveness of counterparty relationships are analyzed.

4 Results and discussions

Among the most common methods of complex multifactor segmentation, the grouping method and the multidimensional statistical analysis method are distinguished. The method of multidimensional statistical analysis (or multidimensional classification) is the simultaneous multidimensional (automatic) classification of objects on several grounds. The most effective method is the cluster analysis method. The main instrument for classifying the aggregate of enterprises that can be considered promising suppliers of raw materials for grain processing enterprises is a cluster analysis (Amiri, 2016; Cervenka et al. 2016; Markina et al. 2017). A great advantage of cluster analysis is that it makes it possible to divide objects not by one feature, but by a number of features. In addition, cluster analysis, unlike most mathematical and statistical methods, does not impose any restrictions on the type of objects under consideration and allows one to study a variety of initial data of an almost arbitrary nature.

For the analysis, we chose Poltava region, since it occupies the seventh place in Ukraine in terms of the area of the territory, but at the same time it occupies the second place in the production of gross output in agriculture. In terms of agricultural production, the region belongs to a group of regions with a high level of rural economy. The agrarian sector of the regional economy is represented by 430 agricultural enterprises (which use a total area of 1325,3 thousand hectares, and the average size of the enterprise is 3000 hectares) of 2020 farms (which use a total area of 242,8 thousand hectares, and average farm size is just about 120 hectares) and 199,9 thousand of individual peasant farms (which use a total area of 279,4 thousand hectares).

In 2017, the Poltava region ranks third among the regions of Ukraine in gross grain harvest (4,2 million tons), the fourth place in the production of soybean (315,2 thousand tons) and sugar beet (1,4 million tons). The volume of harvested corn for grain reached 2,9 million tons, which is the highest indicator in the state (The Main Department of Statistics in the Poltava region). In our opinion, conducting research on this agricultural crop is rather important, since its export orientation and potential still impede the development of the internal grain market. First and foremost, this concerns grain processing enterprises that lose their raw materials base and receive less revenue that could be reinvested in the modernization of production in order to further increase the added value of products on the basis of deep grain processing.

In order to conduct the analysis, we carried out the corresponding preparation of the data. At the same time, data that are not peculiar to the aggregate, or the so-called emissions and extreme values, were excluded. From the database of all agricultural enterprises in the Poltava region, which report in the form No. 50-ag, enterprises that do not have data on the production and sale of corn grain and enterprises with extreme values were excluded. These enterprises can not be characterized as typical ones, but are not of interest for studying the regularities in the formation of the corn grain supply in the Poltava region. As a result of this filtration, out of a total of 451 enterprises in the Poltava region, 350 economic units were selected by us for analysis.

The main specificity of the activities of agricultural enterprises, as the main suppliers of raw materials for grain processing enterprises is a rigid connection with land resources. This imposes corresponding restrictions, therefore the geographical characteristic in this case is the determining factor. This factor we determine through an accessible parameter for analysis – administrative territorial division, which is historically developed with due regard for the appropriate allocation of productive forces. For the analysis, 350 units of enterprises were taken, which according to the administrative-territorial division are distributed as follows: 17 enterprises from the Velyka Bahachka district, 18 enterprises from Hadiach district, 24 – from the Hlobyne district, 13 from Hrebinka district, 11 – from Dykanka district, 18 – from Zinkiv district, 18 – from Karlivka district, 21 – from Kobeliaky district, 6 – from Kozelshchyna district, 10 – from the Kotelva district, 10 – from the Kremenchuk district, 12 – from Lokhvytsia district, 12 – from Lubny district, 6 – from Mashivka district, 14 - from Myrhorod district, 16 – from Novi Sanzhary district, 12 – from Orzhytsia district, 20 – from Pyriatyn district, 22 – from Poltava district, 13 – from Reshetylivka district, 15 – from Semenivka district, 17 – from Khorol district, 7 – from Chornukhy district, 10 – from Chutove district, and 8 enterprises – from the Shyshaky district.

The next stage of the study is the distribution of objects by homogeneous groups and the establishment of qualitative relationships between groups with similar values of indicators. Indicators reflecting the actual and potential opportunities of enterprises in the formation of corn grain supply, include: the volume of production and sales, as an actual and prospective intention to contribute to market capacity; the yield of corn for grain, as a natural prerequisite for highly efficient corn production; the average selling price of corn for grain, as a reflection of the instantaneous characteristics of the timing of grain sales (can be established by comparing the actual selling price

with typical seasonal price fluctuations / growth rate). Output indicators, grouped by administrative-territorial division, are presented in Table 1.

Table 1. Classification of enterprises that form the supply of corn grain in the market of the Poltava region

	Administrative-territorial districts	Volume of production, centners	Volume of sales, centners	Productivity, centner / ha	Average price, UAH / tons
1	Velyka Bahachka district	87076	102448	72,0	2592
2	Hadiach district	55375	122890	63,0	2619
3	Hlobyne district	47778	45663	71,1	3041
4	Hrebinka district	54159	51663	68,7	2486
5	Dykanka district	46144	64266	71,0	2283
6	Zinkivdistrict	33250	52698	67,2	2426
7	Karlivka district	66008	74244	67,3	2552
8	Kobeliaky district	26508	23501	66,5	2572
9	Kozelshchyna district	183324	220601	74,3	2586
10	Kotelva district	64667	66446	76,9	2725
11	Kremenchuk district	40391	37932	77,5	2660
12	Lokhvysia district	61379	64892	64,2	2576
13	Lubny district	28191	26737	47,4	2664
14	Mashivka district	196332	160983	69,2	2686
15	Myrhorod district	145259	137355	85,0	2617
16	Novi Sanzhary district	89482	134107	84,6	2654
17	Orzhysia district	118502	141606	65,4	2686
18	Pyriatyn district	44108	46302	88,7	2526
19	Poltava district	28565	36001	67,7	2401
20	Reshetylivka district	144435	175091	78,5	2627
21	Semenivka district	81574	109990	75,5	2767
22	Khorol district	34453	35604	67,5	2771
23	Chornukhy district	20055	21007	66,7	2662
24	Chutove district	57829	65172	66,6	2528
25	Shyshaky district	110789	120214	75,6	2654
	Average value	66798	77607	71,2	2 614

Source: Department of Statistics in Poltava region (2018)

Characterizing the prepared initial data, we consider it advisable to note that the largest level of supply of corn grain is provided by the enterprises of Kozelshchyna, Reshetylivka and Mashivka districts which together provide about a quarter (26,04%) of all corn grain produced in the region to the market of the Poltava region. A distinctive feature is also the territorial proximity of these areas, which allows us to talk about the prospect of developing a new grain processing cluster.

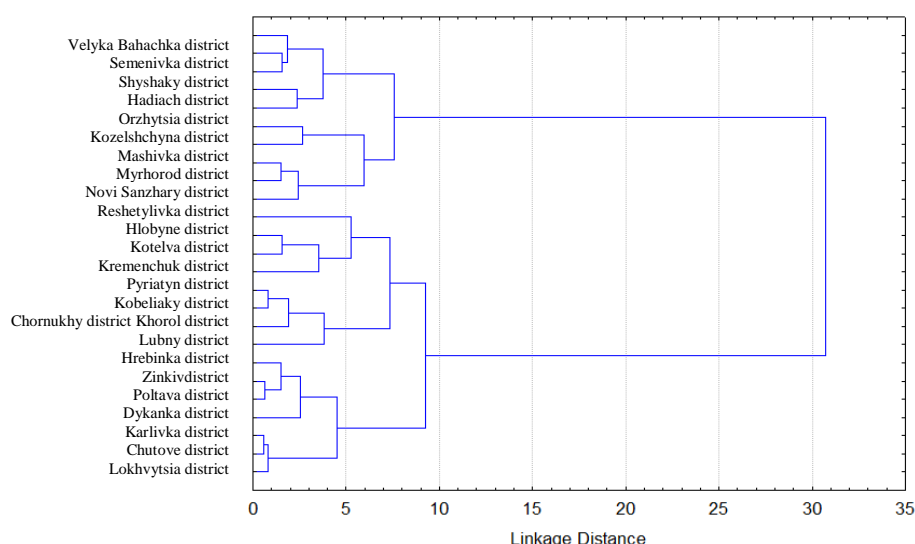


Fig. 1. The tree diagram of the cluster analysis of participants in the agrarian market of the Poltava region, which form the supply of corn grain

Source: Own results

Analyzing the correlation of production and sales (the level of marketability) for clarifying the stability of corn production for grain, we consider it expedient to note that nowadays most of the regions demonstrate the appropriate stability of corn production and sales for grains, while increasing sales volumes in the range of 20%

mainly due to increased yields or crop areas. Some “failures” in the implementation, that is, an implementation rate of less than 100%, which can be explained by the production of grain for own feed purposes, are observed in the Mashivka and Kobeliaky districts.

The highest level of realization of the natural potential in the analyzed group is the Pyriatyn, Myrhorod, and Novi Sanzhary districts, the average yield level by which is almost 20% higher than the average Poltava region level. On this indicator, on the contrary, there is a strong dispersal of areas with high yield indicators.

According to the price characteristic of the sale of corn grain by its producers in the Poltava region, it can be asserted that the best price proposals belonged to the producers of Hlobyne district, Semenivka district and Khorol district, for which the prices for corn were 5-15% higher than the regional average. At the same time, geographical characteristics are marked by a single territorial focus.

By using the STATISTICA software package according to the Ward method and the Manhattan distance measure, we obtained a dendrogram for clustering analysis of grain producers in the agricultural market in the Poltava region, which form the supply of corn grain (See Figure 1). On this dendrogram, the vertical axis represents observations, and the horizontal axis represents the disjunction distance. Thus, at the first stage, the Karlivka and Chutove districts were united, which have the minimum distance, and at the last stage all the districts were united into regional clusters.

The data obtained as a result of statistical processing shows several different variants of the possible grouping of data, so it is necessary to establish a rational number of clusters. According to the dendrogram, it can be stated that it is rational to classify grain producers in the region at a value of linkage distance = 6, which is equal to 5 clusters. Thus, groups of administrative-territorial units of the Poltava region can be formed into clusters as follows (See Table 2).

Table 2. Clustering of participants in the agrarian market of the Poltava region, which form the offer of corn grain in the administrative-territorial division

No.	The administrative-territorial unit that enters the cluster
FIRST CLUSTER	Velyka Bahachka district
	Semenivka district
	Shyshaky district
	Hadiach district
	Orzhysia district
SECOND CLUSTER	Kozelshchyna district
	Mashivka district
	Myrhorod district
	Novi Sanzhary district
	Reshetylivka district
THIRD CLUSTER	Hlobyne district
	Kotelva district
	Kremenchuk district
	Pyriatyn district
FOURTH CLUSTER	Kobeliaky district
	Chornukhy district
	Khorol district
	Lubny district
FIFTH CLUSTER	Hrebinka district
	Zinkivdistrict
	Poltava district
	Dykanka district
	Karlivka district
	Lokhvytsia district
	Chutove district

Source: Own results

An additional fact confirming the reliability of the proposed model for the classification of market activity of corn grain producers is the unification of administrative units that are territorially concentrated. For example, in the second cluster Kozelshchyna district, Mashivka district, Novi Sanzhary district and Reshetylivka district form the corresponding regional belt.

Thus, it is proved that the existing economic conditions are characterized by commonness and convergence in the relevant points of the region, that is, we can bring the enlarged economic section reflecting the characteristic conditions and principles of economic activity. These conditions and peculiarities will form the basis for the marketing of processing enterprises when forming the appropriate raw materials policy. Further, it is necessary to consider in detail the economic characteristics of certain clusters (Table 3).

The group of enterprises of the first cluster of corn producers included 72 farms, while the second cluster included 55 farms, the third one – 64 farms, the fourth one– 57 farms and the numerous fifthclusterincluded 102 farms. When analyzing economic and technological indicators by groups, it is obvious that on the whole, for

the group of enterprises under study, there is a clear tendency to form a stable sensitivity of the productivity of enterprises to an increase in costs per 1 ha of sown area.

Table 3. Clustering of agricultural enterprises in the Poltava region in terms of production and sales of corn grain

Indicators	Clusters of enterprises for administrative-territorial division					Average in the aggregate
	I	II	III	IV	V	
1. Number of enterprises	72	55	64	57	102	350
2. Average level of profitability of grain, %	61,76	61,15	66,89	54,88	57,83	60,34
3. Average profit from the sale of grain, thousand UAH	7069	13021	8190	10025	6731	8592
4. The average amount of grain sold, centners	80862	107112	62256	98578	57313	77607
5. The average price of 1 ton of grain, UAH	2607	2618	2825	2542	2526	2614
6. The average cost of 1 ton of sold grain, UAH	1612	1624	1693	1641	1601	1631
7. Average level of grain marketability, %	97	138	135	116	109	117
8. Average gross grain yield of corn, centners	75304	82056	51460	83356	52936	66798
9. Average sown area of corn grain, hectares	965	1 020	733	977	696	855
10. Average productivity of corn grain, centners from 1 hectare	71,36	78,09	71,65	73,20	66,14	71,2
11. The average cost per 1 ha of harvested corn for grain, UAH	10597	12190	11052	10818	10630	10976
12. The average share of corn in grain crops, %	54,75	61,47	53,96	61,69	53,19	56,34
13. Average share of corn in tilled crops, %	55,60	58,13	61,97	60,17	59,89	59,16

Source: Own results

In particular, the sale of grain was the most profitable with a level of profitability of 66,89% with an average cost per 1 hectare within 11,052 thousand UAH. This is not the maximum, but the largest cost per hectare of corn crops for grain in the regional level. In addition, the cluster with the highest cost per 1 hectare of acreage received maximum profit and formed a supply of corn grain on the market. As part of the marketing policy of a grain processing enterprise, the second cluster is the main segment of the development of sustainable supply relations. This group consists of enterprises that have established technologies for obtaining sufficient return on investment. A significant contribution to the efficiency of enterprises of this group is made by the market factor, as evidenced by the average selling price, exceeding the average regional level. Such a situation can be explained by the fact that these enterprises have all the possibilities for storing corn grain before the formation of acceptable purchase prices and a sufficient level of financial stability.

Significant interest for the development of supply relations of grain processing enterprises is represented by grain-producing enterprises, which constitute the fourth cluster. The defining characteristic of this cluster is the maximum grain supply per enterprise. However, with a slight deviation of production costs per hectare from the average regional level, the enterprises of this group are significantly inferior (about 10%) in the level of profitability, mainly due to a lower price. The improvement of pricing policy in the process of organization of interaction with enterprises of the fourth cluster is an important motive for establishing constant supply relations between grain producers and grain processing enterprises.

Thus, based on the results of the proposed model for the classification of participants in the agricultural market in the Poltava region, which form the supply of corn grain, it is established that the entire aggregate of grain-producing enterprises in the Poltava region, taking into account the territorial location, can be divided into: a group of enterprises with high attractiveness for organizing the supply relations of the grain (these are enterprises of the second and third cluster); a group of enterprises with prospective attractiveness that have an undisclosed potential for effective interaction with grain processing enterprises (this is the fourth cluster); a group of enterprises with low attractiveness (here we are talking about the first and fifth clusters only). A group of enterprises with low attractiveness can also be an effective participant in relations with grain processing enterprises; however, optimal interaction parameters should be defined taking into account the riskiness of the activities of these enterprises.

The usefulness of the proposed methodology in determining the effective segment of raw material suppliers for grain processing enterprises engaged in deep processing of corn grain should be considered in comparison with the accepted practice of assessing potential suppliers. Obviously, a simple measure to increase the profitability of a grain processing enterprise is to find the ways to reduce the cost of purchasing raw materials (for example, corn grain). To form similar conditions for the subsequent comparison, the entire aggregate of corn-producing enterprises was divided into five groups (See Table 4).

According to the Table 4, it is difficult not to notice a significant fluctuation in the parameters, especially the beginning of the price range. Thus, the “failure” of the profitability of the first group relative to the second group of enterprises is almost 20%, the difference in costs per 1 hectare of corn crop area per grain between the first and second, second and third group of enterprises is about 10%.

Under these conditions, it is difficult to make assumptions about the long-term effectiveness of prospective raw material suppliers by grain producers. In addition, we can note a large concentration of corn sowings (the ratio between grain and tilled crops is 10 times more than the cluster classification), which indicates a priority specialization in the production of corn. On the one hand, such a ratio can be perceived as a positive argument, but

on the other hand, this narrows the diversification of grain producers, which negatively affects the economic security of prospective suppliers.

Table 4. Grouping of agricultural enterprises producing corn grain in the Poltava region by the price and sales

Indicators	Groups of enterprises, depending on the price of sales of corn grain					Average in the aggregate
	I	II	III	IV	V	
	up to 2200 UAH/tons	from 2220 to 2500 UAH/tons	from 2500 to 2800 UAH/tons	from 2800 to 3100 UAH/tons	more than 3100 UAH/tons	
1. Number of enterprises	49	113	122	27	39	350
2. Average level of profitability of grain, %	25,60	46,21	73,87	68,18	97,16	60,34
3. Average profit from the sale of grain, thousand UAH	842,2	2098,1	7030,6	23653,0	31604,1	8592
4. The average amount of grain sold, centners	15173	28111	74258	258809	184491	77607
5. The average price of 1 ton of grain, UAH	1950,5	2354,5	2636,1	2903,4	3933,8	2614
6. The average cost of 1 ton of sold grain, UAH	1553	1610	1516	1726	1995	1631
7. Average level of grain marketability, %	86	106	122	171	138	117
8. Average gross grain yield of corn, centners	30789	30535	61989	191069	146115	66798
9. Average sown area of corn grain, hectares	450	402	834	2 289	1 747	855
10. Average productivity of corn grain, centners from 1 hectare	62,20	68,51	76,39	77,19	70,34	71,25
11. The average cost per 1 ha of harvested corn for grain, UAH	9189	10573	11843	11841	11076	10976
12. The average share of corn in grain crops, %	45,32	49,60	59,58	70,56	69,69	56,34
13. Average share of corn in tilled crops, %	49,84	55,77	60,48	69,92	69,08	59,16

Source: Own results

A logistic component also deserves special attention. Figure 2 shows the geography of segments of the market for grain raw materials according to cluster classification and with a focus on price indicators. For example, the distribution of enterprises making up the second price group is presented.

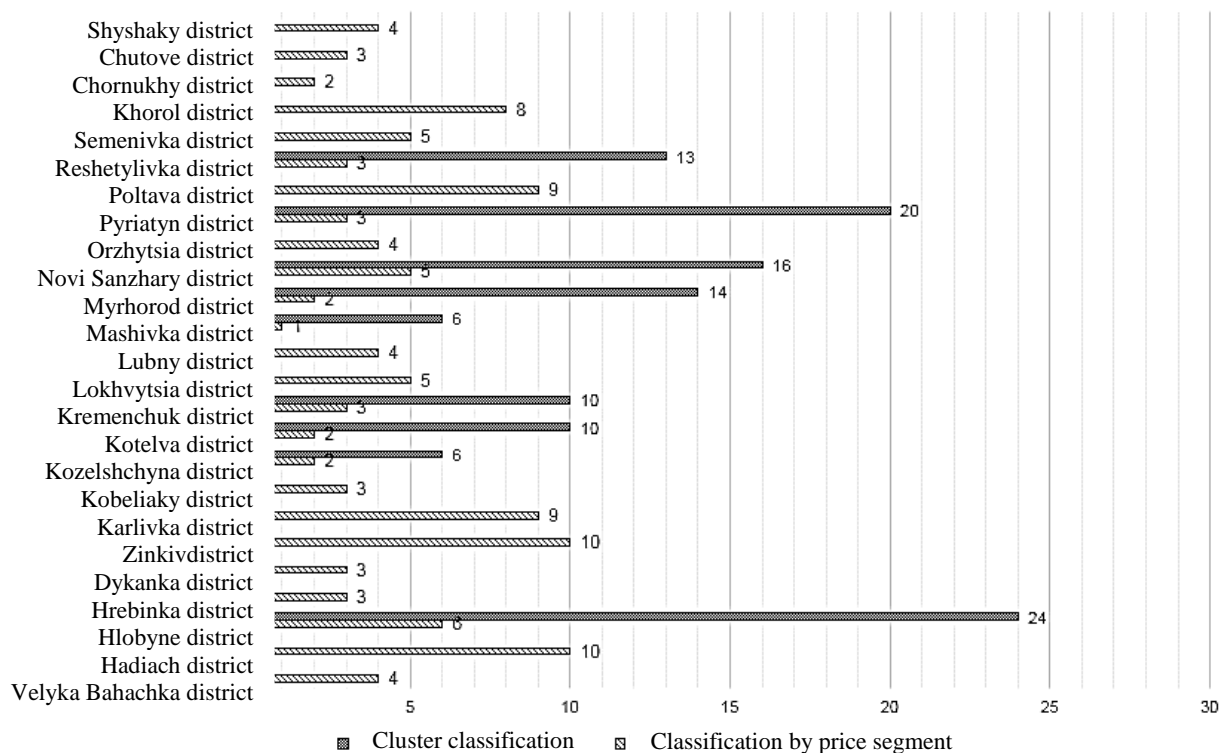


Fig. 2. Comparison of distribution of enterprises-grain producers according to cluster classification and with orientation to price indicators

Source: Own results

According to the data presented in Figure 2, one can judge the complex geography of the distribution of enterprises

selected by price classification. With this approach, all areas of the region are taken into account, which makes it impossible to judge the optimal territorial concentration of grain processing and the efficiency of logistics in general.

5 Conclusions

Thus, summing up the study on the formation of an effective methodological toolkit for the classification of participants in the agricultural market in the Poltava region, which form the supply of grain for the purpose of determining the optimal supply segment of the grain processing enterprise-leader, we note that the proposed model has advantages over the traditional approach due to the possibility of multidimensional analysis of indicators of compliance of potential suppliers and the observance of uniform filling of groups without deep stratification.

The data obtained make it possible to draw conclusions that efficient supply chains for raw materials can be built only taking into account the technical and economic parameters of the activities of agricultural enterprises engaged in the production of targeted grain products. The constructed classification maps and economic characteristics indicate a greater homogeneity of the facilities in terms of building the capacity for sustainable grain supply for the processing of the proposed research method. A wide range of differentiation under traditional classification methods distorts the potential of enterprises in the processing system because of the lack of information on the origins of price competitive advantages.

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