

**THE RIGHT-BANK UKRAINE INDUSTRIAL PRODUCTION AND  
INTRA-REGIONAL SPECIALIZATION  
IN THE MID-19TH CENTURY**

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**Abstract.** The proposed section of the collective monograph is devoted to the industrial development analysis of the Right-Bank Ukraine three provinces' (Kyiv, Podillia, Volyn) with a total area of 154643 sq. km and a population of 4683860 in the mid-1840s. That was the time when the first clear signs of commodity industrial production appeared in a large number of local landowners' estates, took place the spread of manufacturing, focused mainly on local raw materials and the local market. It was in the mid-1840s that not only descriptive but also statistical sources of historical and economic orientation became widespread, which is greatly expanding the researcher's ability to create reconstructive models of ancient times economic processes.

The *purpose* of our study is to identify the nature and degree of industrial specialization of the Right-Bank Ukraine' 36 districts in various industries, marketability of production through its volume, fixed in monetary terms.

The research *methodology* is determined by the features of the information base, which combines descriptive and statistical sources. Accordingly, first we give a general description of the local industry, its raw material base, organization and technology, the approximate range of consumers. In the second stage, based on the statistical data presented in the relevant tables, we use multidimensional statistical cluster analysis to make a meaningful classification of 36 districts by the nature and direction of their industrial specialization. As a result, we obtain a model which elements are grouped by common qualitative characteristics, the distance (degree of similarity or difference) between objects and groups can be measured by multidimensional scaling (in our case – the distance in

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Euclidean space). Macrogroup A from 7 districts of the northern part of the region with a population nearby 799600 was received 85,8% of industrial revenues from the processing of livestock products. Macrogroup E united 14 districts, mainly in the southern zone of the Dnieper Right-Bank, with a population of 1616370. It was characterized by in-depth specialization in the plant origin products processing, from which 96,7% of industrial profits were received. Macrogroup C represented by one district of Kyiv with the central regional city and a total population of 176280. Only here 76,5% of industrial profits came from the processing raw materials of mineral origin. Macrogroup D includes 8 districts in the south of the Right Bank with a population of 1090600 people and natural conditions equally suitable for crop and livestock production. Hence the balance of the processing industry and revenues from it – 48,5% of processing of crop products and 44,5% of processing of livestock products. Macrogroup B included 6 districts with a population of 816350, whose farms did not have a narrow production specialization: 26,1% of industrial profits came from processing of plant products, 33,6% from processing of livestock products, 40,3% of industrial profits from processing of minerals.

The *practical significance* of our study is that the results obtained can be used in the construction of broader paleoeconomic reconstructions, in the educational process, in writing scientific articles and monographs.

The *originality* and *scientific novelty* of the work lies in the formulation of the problem, the methodology used, the results obtained. Such a study for the Right-Bank Ukraine region of the mid-1840s is conducted for the first time.

### Introduction

The middle of the 19-th century is an important time in the Eastern Europe history. The era of feudalism is coming to its final stage, and a transitional period of social and economic reforms of the 1860s and 1880s is approaching, aimed at bringing the Russian Empire on the main path of capitalist development. Despite the stagnant nature of the predominantly agrarian economy, several leading industrial regions of the empire European part with their specialization were formed in the 1830s–1850s [12; 16; 20], which became an important prerequisite for the formation of an all-Russian market to the end of the century.

These processes could not but affect the Ukrainian lands, the boom of the industrial renaissance of which occurred in the last quarter of the 19-th century. Among the three regions of the then Ukraine in terms of the main parameters (ethnic, religious, social, economic) the most unique was the Dnieper Right-Bank, which includes the lands of the historical Kyiv, Podillya, Volyn provinces. In contrast to the Left Bank (Little Russia) and the South (New Russia) of Ukraine in the middle of the 19-th century there was the highest level of serfdom [9], which contributed to the concentration of industrial production in landlords' estates using cheap labor dependent peasants. In the mid-1840s almost 86% of production in the Kyiv province was concentrated in private estates. It was determined by the availability of significant free capital from landlords, opportunities for self-financing and obtaining significant loans, and the use of excess serfs labour in the processing of agricultural products [19, pp. 2–3]. The owners of the enterprises produced mineral commodities also received considerable profits.

The aim of our study is to identify, as far as possible, the achievements of this option of primary industrialization by building a statistical model of intra-regional industry specialization, tied to the market through the share of individual industries in total industrial profit.

Let us consider the main types of industrial production on the three main industries – processing of crop products, processing of livestock products, products using raw materials of mineral origin.

### **1. Processing crop products**

#### **1.1. Distillation**

It should be noted, that contemporaries regarded distillation as a “fake industry”, perceiving it as a convenient form of storage and a profitable way to sell part of the grain, potato, and fruit crops to landlords, use the excess labour of dependent peasants, and increase local prices for grain, fuel. Most often, statistics did not include the distillery in the list of industrial enterprises, indicating only the total volumes of excise goods. However, all economists agreed that the production and sale of vodka products were important factors in filling the state budget – 46% in 1859 (look, for example: [8, pp. 222–224; 15, p. 305; 18, p. 171]). That is why we, following the then experts on this issue, provide a brief description of the development

of distillation in the Right-Bank Ukraine of the middle of the 19-th century without entering the volume of its products in the Table 1.

The Kyiv province. According to the data for 1846, in the Kyiv province on the estates of the lords, which occupied 2331718 desyatinas of land and used the labour of 348813 male serfs, there were 384 operating distilleries. Their total production amounted to 4710104 buckets of vodka and alcohol out of 533105 quarters of grain. The total cost of produced alcohol of different quality amounted to 1593310 rubles with absolute profitability after its implementation, 25%. Vodka factories were located in Cherkaskyi, Kyivskiy and Chyhyrnskiy districts and put on the market about 57430 buckets of their products (3.4% of all distillery production). At the same time, 375550 buckets of beer, 12520 buckets of honey were brewed at 77 breweries, and the total annual production of vodka, beer and honey was estimated at 220900 rubles [18, pp. 170–176]. P.K. Menkov provided other data on the productivity of distillery in the Kiev province of the mid-1840s: 208 distilleries produced 2500000 buckets of “foamy wine” for 752599 rubles, the last figure we meet in the K.I. Arsenyev’s publication [2, p. 125; 15, p. 305]. According to data from the beginning of the 1850s, 3253420 buckets of alcoholic beverages were produced in 362 operating distilleries of the Kyiv province, of which up to 300000 buckets were exported outside the region [5, p. 62; 12, pt. II, p. 77].

The Podillia province. On the landlords estates of the late 1840s there were 182 distilleries that produced 2529492 buckets of alcohol, including from potatoes that were mixed with grain, for a total of 1011800 rubles at a selling price of 6070780 rubles. In the Baltskiy district, the landowner Ruzhitskiy produced up to 600 buckets of vodka from sugar production wastes [3, p. 120–121].

In 1860, 388 distilleries worked in the Kyiv province, 328 in the Volyn and 251 in the Podillia, where 18208583 buckets of alcoholic beverages were produced. Among these enterprises, only two in the Kyiv province had a capacity of 100000 buckets per year, and 85% were small enterprises [8, p. 296, 298, 304–305].

The Volyn province. Features of the Volyn raw material base did not contribute to the significant development of distillation. In 1846–1849, the average annual production amounted to 1206397 “foam wines” and 841839 buckets of “trial wine” [4, p. 95]. “Foam wine” meant the best brand

## The Right-Bank Ukraine industrial production in 1845–1847

Provinces / districts	Industries and production amounts in rubles (Profit share by industries %)						Total
	1. Processing crop products	%	2. Livestock processing	%	3. Manufacture of mineral products	%	
<i>The Kyiv</i>	<b>3346180</b>	<b>52,2</b>	<b>1043368</b>	<b>16,3</b>	<b>2020212</b>	<b>31,5</b>	<b>6409760</b>
Kyivskiy	43130	1,7	555600	21,8	1948802	76,5	2547532
Berdychivskiy	47715	50,3	45668	48,1	1490	1,6	94873
Cherkaskiy	2153220	99,6	0	0,0	9170	0,4	2162390
Chyhyrinskiy	556000	98,2	0	0,0	10100	1,8	566100
Kanivskiy	183890	43,8	206900	49,3	29300	7,0	420090
Lypovetskyi	38250	91,4	0	0,0	3580	8,6	41830
Radomyshl'skyi	34880	22,3	114100	73,1	7150	4,6	156130
Skvyr'skyi	12500	16,6	60800	80,8	1970	2,6	75270
Tarashchanskyy	66275	88,5	0	0,0	8650	11,5	74925
Umanskyi	52370	83,9	10050	16,1	0	0,0	62420
Vasylkivskiy	77950	60,8	50250	39,2	0	0,0	128200
Zvenyhorodskiy	80000	100,0	0	0,0	0	0,0	80000
<i>The Podillia</i>	<b>512939</b>	<b>73,6</b>	<b>132395</b>	<b>19,0</b>	<b>51449</b>	<b>7,4</b>	<b>696783</b>
Kamianetskyi	103744	90,3	9968	8,7	1200	1,0	114912
Baltskyi	128144	87,0	19200	13,0	0	0,0	147344
Bratslavskiy	31700	72,1	12000	27,3	240	0,5	43940
Haisynskiy	40100	78,5	10605	20,8	358	0,7	51063
Letychivskiy	8975	46,6	1490	7,7	8800	45,7	19265
Litynskyi	66219	82,0	13170	16,3	1375	1,7	80764
Mohylivskiy	23865	62,5	13220	34,6	1100	2,9	38185
Olhopil'skyi	14400	88,8	1820	11,2	0	0,0	16220
Proskurivskiy	21405	37,3	23594	41,1	12390	21,6	57389
Ushytskyi	17720	40,5	22021	50,3	4027	9,2	43768
Vynnytskyi	53287	71,0	3851	5,1	17959	23,9	75097
Yampil'skyi	3380	38,3	1456	16,5	4000	45,3	8836
<i>The Volyn</i>	<b>578403</b>	<b>52,7</b>	<b>406487</b>	<b>37,0</b>	<b>112954</b>	<b>10,3</b>	<b>1097844</b>
Zhytomyr'skyi	11200	20,6	15820	29,1	27403	50,4	54423

(End of Table 1)

Provinces / districts	Industries and production amounts in rubles (Profit share by industries %)						Total
	1. Processing crop products	%	2. Livestock processing	%	3. Manufacture of mineral products	%	
Dubenskyi	9280	22,0	32550	77,1	400	0,9	42230
Kovelskyi	515	14,5	3040	85,5	0	0,0	3555
Kremenetskyi	9420	16,3	32550	56,4	15715	27,2	57685
Lutskyi	0	0,0	81510	100,0	0	0,0	81510
N.Volynskyi	36467	31,3	33428	28,7	46507	40,0	116402
Ostrozkyi	0	0,0	52700	100,0	0	0,0	52700
Ovrutskyi	13446	62,4	3370	15,7	4716	21,9	21532
Rivnenskyi	10995	7,7	131075	91,7	825	0,6	142895
Starokonstantynivskyi	18620	41,6	14031	31,3	12148	27,1	44799
Volodymyrskyi	360	3,4	4913	46,7	5240	49,8	10513
Zaslavskyi	468100	99,7	1500	0,3	0	0,0	469600
<b>Right-Bank Ukraine</b>	<b>4437522</b>	<b>54,1</b>	<b>1582250</b>	<b>19,3</b>	<b>2184615</b>	<b>26,6</b>	<b>8204387</b>

of vodka, which was obtained from the light fraction of “simple wine” by additional distillation over low heat using charcoal filters (“pervach”). 100 buckets of “pervach”, diluted with 24 buckets of pure spring water, produced “foamy wine”, which was equal in price to grape wines; “Trial wine” – vodka obtained by breeding 100 buckets of grain alcohol with 331/3 buckets of water for sale in taverns, especially popular in the first half of the 19-th century [13, p. 183–184].

### 1.2. Sugar industry

The Kyiv province. The first sugar factory in the Kyiv province was founded in 1834 in the estate Orlovets of Cherkaskyi district by Count Leo Pototskyi. Other enterprises were opened a few years later in Zvenyhorodsky and Lypovetsky districts. However, a real breakthrough in this matter began in the 1840’s after the successful launch in 1838 of the Smilyanskyi sugar cluster by Count Alexei Bobrinskyi. After 10 years, 37 sugar factories with

28 steam boilers, 11 steam engines and 247 hydraulic presses were already operating in the province. Cherkasy was the first in the number of factories and sugar production. Most of the enterprises belonged to the landlords and were located on their estates.

The publication of I.I. Fundukley contains the classification of sugar factories contemporary to him: 1) producing the highest quality refined sugar; 2) producing sugar-sand with the possibility of subsequent refining, where there were steam devices used; 3) producing sugar-sand in stone buildings; 4) producing sugar-sand on an open fire in stone buildings; 5) producing sugar-sand over an open fire in wooden buildings. The sugar factory of Count Bobrinskiy in Smila in 1847 was estimated at 145500 rubles (two of his predecessors burned at a cost of 32000 and 58000 rubles). The second-class plant costed the owner 100000 rubles, the third – almost 85000 rubles. The total value of all sugar enterprises in the Kyiv province at the end of the 1840s amounted to 3172000 rubles. During the season, they processed 7154230 poods of beets to produce 258099 poods of white sugar and 18867 poods of yellow. The total costs of sugar factories in the Kyiv province for production in 1846–1847 amounted to 1216919 rubles, gross profit – 1635535 rubles and net profit of 418455 rubles. A desyatina of sugar beets yielded an annual gross income of 144 rubles, a net income of 36 rubles. The most profitable enterprises were in Cherkasky and Chyhyrinsky districts (22 – 28%). During the production season of 1846, sugar factories in the Kyiv province used: firewood 39,916 sq. sazhen, straw for fire 800 sazhen, animal coal 235055 poods, lime 10417 poods, and also 11927 workdays of dependent peasants. The income of participants and suppliers of works, except for the owners, amounted to 1161887 rubles, including 88000 rubles for the workers' wages [19, p. 13–26, 36, 39, 45–46, 47, 75]. In 1853, there were 72 sugar factories in the province, at which 13,135 workers produced goods worth 2600000 rubles. In 1859, 31859 workers were employed at 75 sugar factories in this province, and they produced 9923739 rubles worth of products. Five years later, sugar production reached 10146096 rubles with a reduction in the number of employees to 20583. The density of sugar factories in the south of the Kyiv province at that time was one of the highest in the world [1, pp. 42–44; 11, p. 334–334; 12, pt. II, p. 77].

The Podillia province took second place after the Kyiv province in sugar production. In 1845–1846, there were 25 sugar factories, where they

produced products for 308900 rubles. Such plants were small and used beets, which were grown on 30-100 desyatinas of fields near the plant; a producer bought part of the beets from the peasants of neighboring villages at a price of 40 kopecks for a quarter. The main sugar plants were located in the city of Kamyanets and in the districts of Lityn and Vinnytsia. At the beginning of the 1850s, 37 sugar factories operated in Podillia with 3487 workers, who produced sweet products on 650000 rubles. After nine years, the number of industries decreased to 30, but the number of workers increased to 5850 people and production volumes to 1125242 rubles [4, p. 121–122, Appendix, table 13; 7, p. 182; 12, pt. II, p. 161].

The Volyn province. The development of sugar production in the Volyn significantly lagged behind the neighboring provinces of the Right-Bank Ukraine. In 1848 there were only 10 sugar factories with an annual production volume of 635970 rubles, and only at the Shepetivskyi refinery plant the annual cost of production amounted to 469600 rubles. In 1853, there were already 14 sugar factories with 1034 workers and a production capacity of 855000 rubles for the season. Ten years later, the Volyn sugar-makers at five enterprises using 1184 workers produced 1365080 rubles [14, p. 98, Appendix, table 5; 7, p. 160; 12, pt. II, p. 40].

In 1864, in three Right-Bank Ukrainian provinces, sugar was produced on 13044720 rubles [7, p. XIV].

### 1.3. Mill business

The Kyiv province. In 1847, there were 3008 mills, including 1964 (65%) watermills and 1044 (35%) windmills. Another 107 mills were driven by machines or horses. More water mills were located in the districts of Uman and Skvyra, and windmills were spread in four southern districts – Zvenyhorodskyi, Chyhyrinskyi, Cherkaskyi and Kanivskyi. In water mills, an average of 3 to 6 quarters of the grain can be crushed into flour per day, in windmills, up to 4 quarters. During the year, 2099950 quarters of grain were processed at all the mills in the province [19, p. 96–103]. P.K. Menkov in his work cited other data on the number of mills: water 2223 wind 880, floating on the Dnieper and Prypiat 123 [2, table on p. 126]. Mills also worked in large numbers in Volyn and Podillia, but reliable statistics on this issue were not available in the publications until the beginning of the 20-th century [11, p. 184 (Compare: 17, p. 63)].



In addition to these industries of the first group of enterprises, associated with the processing of crop products in the middle of the 19-th century, it was customary to include paper making, weaving, pasta, tobacco, cable factories and some others [19, p. 4]. As of the end of the 1840s, the production volume of this kind of industry was estimated throughout the Right-Bank Ukraine at a rate of about 4740000 rubles per year and amounted to 73% of the gross industrial income of the region. In terms of production, the absolute first place was occupied by Cherkaskyi district (2153220 rubles), followed by Chyhyrnskyi, Zaslavskyi, Baltskyi, Kamyanetskyi districts with a significant lag (Table 1) [3, Appendix, table 13; 4, Appendix A; 19, p. 4–9].

### **2. Livestock processing**

#### **2.1. Clothes manufactories**

The Kyiv province. In the first half-mid 19-th century among the numerous clothes manufactories, several stood out with their equipment and production volumes. The first of them was founded by Joseph Poniatovskyi in the town of Tahancha, Kanivskyi district in 1806. At first, 10 machine tools worked here and made 3,000 rubles from plain clothes of low-grade wool in year. In 1815, the owner

invited the famous Belgian craftsman Yans, who mechanized production using the latest equipment at the time. In 1838, there were already 120 machine tools working here along with 12 types of other machines, including 41 steam-acted, 39 water, 16 horse and 213 manual-acted ones. The number of workers increased to 670 people. Top-grade wool was partially produced in the estates of Poniatovskyi (800 poods), bought at fairs in Romny and Berdychiv. The annual demand for raw materials was 4600 poods. There were produced 9 types of products painted in 16 colors and shades in the amount of 257027 rubles. Sales occurred mainly on the spot to merchants from adjacent and remote provinces, partly to order at the indicated addresses in Kharkiv, Sumy, Kursk and other cities. Dyes were purchased in Odessa, Berdychiv, Romny, Kharkiv, partially made on the spot, as well as nap cones. Profitability of production ranged from 17 to 21%.

The Korsun clothes factory was founded in 1815 in the same Kanivsky district. Production was focused on meeting local needs for relatively cheap clothes. The annual gross income amounted to 37922 rubles with

production costs of 32539 rubles, and net profit of 14%. The Khabensk clothes factory existed since 1822 in the estate of Princess Radziwill of the Radomyshl'skyi district and belonged to the mechanic Yans along with the agronomist Ther and the princess herself. Since 1832, the princess redeemed shares of associates and became the sole owner of the enterprise. In 1846, 362 persons worked here, including 275 serfs. In 1845, clothes was sold to the cities of Ryl'sk, St. Petersburg, Moscow, Chisinau, Kursk, Berdychiv, in the provinces of the Volyn, Podillia, Kyiv, and Kherson in the amount of 212667 rubles. Another well-known clothes factory, which was located in the town of Stebliv in the same Kanivskyi district, was moved here in 1845 by the landowner Golovinskyi from another estate. Spinning and weaving machines, up to 100 in number, were driven by a water engine on the Ros River. The factory employed 422 workers, including 9 foreigners, made woollen fabrics a year worth a total of 94000 rubles. Other clothes factories were significantly smaller. The total production of clothes in the Kyiv province in 1845 amounted to 264872 arshins. In 1853, 11 clothes enterprises with 1479 workers produced 262000 arshins of products worth 520000 rubles. In the next decade, production did not increase, and the number of enterprises and employed workers gradually decreased [12, pt. II, p. 76; 11, p. 257; 19, p. 119–142].

The Podillia province. The first clothes factory in Podillia began to work in Tulchyn in the 70s of the 18-th century in the estate of Count Stanislav Pototskyi. In 1845, there were already 105 clothes factories with annual production of 49736 rubles. According to 1853, at 112 enterprises with 1069 workers, 380000 arshins of clothes were produced in the amount of 350000 rubles. By the beginning of the 1860s, 39 specialized manufactories were operating in Podillia, mainly in the Novoushytsky district, where the most noticeable was the enterprise in the village of Dunayivtsy, with annual production of 260500 rubles [3, p. 122, Appendix, table 13; 11, p. 248–249, 251; 12, pt. II, p. 161].

The Volyn province. Among the local landowners, who were engaged in various industries, Princess Sangushko, the owner of the half of Zaslavskyi district, was especially notable. In her clothes factory in the town of Slavuta, where 380 workers, annually produced 50000 arshins of various woollen fabrics with a total value of 113000 rubles. In the town of Rozhnytsia, Lutskyi district, 70000 arshins of clothes were annually produced at the

factory of Princess Karolina Chetvertinska. In the village of Simonov, Ostrozkyi district, the cost of production amounted to 25000 rubles. At 14 other clothes enterprises of this region, goods for 20000 rubles were produced, and at 40 factories of the Rivne district for 120000 rubles. At the beginning of the 1850s there were 105 clothes manufactures here, where up to 3000 persons worked and 450000 arshins of fabrics were produced in the amount of about 500000 rubles. Near the end of the decade, the number of enterprises decreased by a third, and production fell by 35% [4, p. 96–97; 11, p. 248; 12, pt. II, p. 40].

### 2.2. Hides processing

The Kyiv province. The largest tannery was located in the suburbs of Kyiv, Kurenivka-on-Syrets, and first belonged to a foreigner Lange, and in 1837 it was bought from him by the merchant Serebrennikov. Among the 65 craftsmen employed at the enterprise, 27 were burghers, 9 were the one-dwellers, 29 were the landlords' peasants of the Orel, Kaluga, Kostroma, Moscow and Kyiv provinces. The working day lasted from 4 o'clock in the morning until the evening with three breaks for food due to the owner of the plant. Raw materials were bought in Novogeorgievsk, Orel, Odessa, Balta, Yelisavethrad, and Kyiv directly from the butchers and at fairs in Kharkiv, Sumy, Berdychiv and other cities. The annual volumes of raw materials were: 42000 cow leathers for morocco, 15000 pieces of bovine leather, and other 4500 pieces. For the process the tannin bark needed up to 60000 poods, lime 1000 quarters, barley 2000 poods, rye 900 poods, fish oil 500 poods, birch tar 300 poods, tar 700 poods, wood 200 cubic sazhen. For lighting in winter, 40 poods of sebaceous candles were used. Annual direct and overhead production costs amounted to 209330 rubles, profit 352000 rubles, net profit 143000 rubles. Other large plants were located in Bila Tserkva and Borodianka, Kyivskiyi district. At the beginning of the 1850s, 33 tanning enterprises operated in the Kyiv province, with 318 workers producing 120000 hides worth 620000 rubles. In the early 1860s, during the crisis of manufacturing, the volume of leather products in the Kyiv province fell to 393283 rubles [11, p. 333; 12, pt. II, p. 76; 19, p. 147–159].

The Podillia province lacked the products of its immediate neighbours. Small tannins were located mainly in the Mohylivskiyi and Proskurivskiyi

districts, and the annual production did not exceed 27100 rubles. A few years later, production volumes decreased to 4500 rubles [3, Appendix, table 13; 12, pt. II, p. 161].

The Volyn province. In the late 1840s, 37 small leather manufactories were operating here, in the early 1850s there were already 74, where 30000 leathers and 11000 sheepskins were processed for a total of 65000 rubles [4, Appendix A; 12, pt. II, p. 40].

### 2.3. Getting animal fat and candle production

In the middle of the 19-th century animal fat was an important technical product, without which many other industries transport, military affairs and daily households could not do. No wonder it occupied the second place in the export of the Russian Empire on the world market after grain bread. Lard heating factories were located near the places of mass slaughter of cattle. From the bull 7-8 poods of fat were heated.

The Kyiv province. The merchant Khodunovskiy's factory for the production of sebaceous candles in Kyiv processed 15000 poods of raw fat from cattle and sheep per year, a third of which was disposed of as waste. The plant worked 7-8 months a year, because the cold weather needed to make candles. The production involved 3 craftsmen and 17 another persons who worked 12 hours a day. For the season, 10000 poods of candles and 8000 poods of soap were made for 64000 rubles, net profit was 26865 rubles. Candle factory in Kyiv, owned by the merchant Bubnov, produced goods for 16000 rubles with a net profit of 610 rubles. The merchant Finke's Kyiv stearin factory produced 2500 poods of candles, had a gross profit of 21600 rubles and net profit of 8000 rubles a year. All 36 workers (16 adults and 20 adolescents) belonged to the landlords' peasants, betrayed by the owner to practice state duties. Worked from 6 am to 7 pm., they ate three times a day for half an hour for breakfast and dinner and an hour for lunch. In total, there were 5 such plants in Kyiv with annual production of 186000 rubles. In the provincial districts in 1845-1848, another 16 candle factories operated with annual production of 148159 rubles. In the early 1850s there were 14 such enterprises in the province with an annual output of 100000 rubles [2, p. 159; 11, p. 193; 12, pt. II, p. 77; 19, p. 159-168].

The Podillia province. In the mid-1840s, 17 lard heating plants were operating in Podillia, the production of which was estimated at 49736 rubles

in year. Of these, 14 worked on local raw materials in Balta, where they fattened 14250 rubles annually, for which 3000 cattle, 7000 sheep, 2500 goats were slaughtered using an additional 560 poods of pork. The Balta lard heating plants sent their products to Odessa. The Mohyliv plant of much lower capacity used cattle from neighboring Bessarabia [3, p. 122].

The Volyn province. At the candle factory of Princess Sangushko in Slavuta, Zaslavskiy district, the best in the province, for the year were made tallow candles for 2500 rubles. There were 23 candle factories in the late 1840s with a total production of 47119 rubles in year [4, p. 98; 11, p. 193].

Soap factories, animal oil mills, and wax mills also belonged to this kind of industry. The gross output of animal processing enterprises on the Right-Bank was approaching 1600000 rubles, or 24% of the region's industrial production. According to the volumes of production of this group, the districts of Kyiv, Kaniv, Radomyshl, Rivne were distinguished (Table 1).

### **3. Manufacture of mineral products**

#### **3.1. Metallurgy and metalworking**

The Kyiv province. The first Kyiv iron plant was founded by Old Believers Degtiarev merchants' family from the Kaluga province with an investment of 57920 rubles. The owners bought raw materials (copper, iron) at the Nizhny Novgorod Fair. Annually, sheet copper for 12-15 thousand rubles was supplied for processing, copper of own production costed 6000 rubles, cast iron – 10-20 thousand rubles. Cast iron was bought mainly at the Kyiv Arsenal in the form of discharged old artillery shells and at the merchant Maltsev's factory on 5000 rubles annually. In addition, English steel for 5000 rubles were used for the manufacture of high quality goods primarily for the new bridge in Kyiv. The average annual cost of raw materials and various other materials amounted to 50000 rubles. Copper and brass used for making equipment for sugar factories and distilleries, pharmacies, cavalry cuirasses and kitchen utensils worth up to 21000 rubles a year. Cast iron tombstones, fences, stairs, stoves and parquet for city squares, presses, gears, spare parts for agricultural machinery, weights, grids, stoves, various things on individual projects worth 26000 rubles per year were made from cast iron. Steam boilers for sugar factories were made of sheet steel for 7500 rubles. The total cost of production in 1847 amounted to 75211 rubles.

Marsh ore deposits were discovered in a number of villages in the Radomyshl district. The low-quality iron obtained from them was used for the manufacture of simple agricultural tools for peasants and for sale in the towns of Kyiv and Volyn provinces.

The Podillia province. In the middle of the 19-th century three metal processing plants operated in Podillia: in the village of Cherny Ostrov of the Baltskiy district were castings for 670 rubles made of bronze; in the town of Proskuriv the plant manufactured copper products at 748 rubles; in Bratslav, Vinnitskiy district, a more powerful plant operated with an annual production volume of 15830 rubles. All raw materials for them were imported from the Russian provinces [3, p. 125].

At the beginning of the 1850s, 14 metallurgical and metal-working enterprises with a total production of 120000 rubles were operating in the Kyiv province [2, p. 111–112; 12, pt. II, p. 77; 19, p. 168–175].

The Volyn province. In the late 1840s, the metallurgical and iron foundries of the Volyn were concentrated in Zhytomyrskiy, Ovrutskiy and Novohrad-Volynskiy districts. In the four best iron foundries, 200 workers produced cast iron for 20000 rubles. At 98 other metallurgical enterprises, about 500 workers produced iron and simple tools for 25000 rubles. At the beginning of the next decade, 51 enterprises produced almost 10000 poods of pig iron for 15000 rubles. Many peasants engaged in marsh iron mines, providing themselves with simple equipment [4, p. 95; 12, pt. II, p. 40–41].

### **3.2. The manufacture of bricks and other building and decoration materials from ceramics**

The Kyiv province. One of the largest private brick factory was founded in the suburbs of Kyiv in 1833 by the pharmacist Heisman. There were 4 ovens and 8 barracks for making raw billets. Clay in an amount of up to 700 cubic sazhen and up to 1000 cubic sazhen of fire-wood for bricks was used annually. The bricks were modelled from April 15 to September 15 and burned all year round. In 1848, 2000000 pieces of brick were produced here with a net profit of 2930 rubles. The Gudim-Levkovich's brick-and-tile factory of in Kyiv manufactured its first products back in 1765 and was one of the oldest operating in the Right-Bank Ukraine to the middle of the 19-th century. Since 1810, they began to produce tiles from Hlukhiv and Mezhihiria clay. The net profit of the enterprise amounted to 890 rubles,

or 37% of current assets. In total, in the early 1850s in the Kyiv and the province there were 6 small tile enterprises and 406 brick factories with an annual production volume of 439250 rubles [11, p. 138; 19, p. 210–217].

In the Volyn province, 236 people worked in 43 small brick factories, in the Podillia there were 13 such plants with an annual production volume of 15755 rubles [3, Appendix, table13; 12, pt. II, p. 40, 161].

### 3.3. Faience and porcelain manufactories

The Kyiv province. The Mezhihiria faience and porcelain state manufactory was founded on the site of a former monastery at the turn of the 18-th and 19-th centuries near Petrivska Mountain with deposits of white pottery clay, when 228 peasants of the state village of Novi Petrivtsi were assigned to it with an annual salary of 36 rubles and the payment of state taxes for them by the Kyiv Magistrate. The plant management was entrusted to a foreigner Kranich with an annual salary of 1200 rubles and 10% of net profit from manufactured products. To this end, he committed himself to presenting the best way to make ceramics, such as English, and teach the boys his skills. The cost of the plant production in 1847 amounted to 31000 rubles. Dishes were sold in Kyiv in a special store and at the factory, where merchants from Kyiv, Chernihiv, Poltava, Kharkiv, Vitebsk, Mogilev, other western and southern cities and provinces came. In 1859, this state-owned manufactory produced goods worth 35500 rubles [11, p. 304; 19, p. 187–206].

The Volyn province. In the town of Baranivka, Novohrad-Volynskyi district, a powerful porcelain and earthenware factory was located with an annual production of porcelain ware on 16000 rubles. At the end of the 1850s, there were 5 similar industries with an annual output of 32000 rubles [4, p. 98; 11, p. 304].

### 3.4. Glassworks

The Kyiv province. The largest growth in glass production in the Kyiv province occurred in the 20-30s of the 19-th century, when there were 9 enterprises with 142 workers, mainly serfs. Later their number did not increase, satisfying exclusively the local population needs [11, p. 295].

The Volyn province. In the late 1840s, the best glass factories in the Volyn were located in Novohrad-Volynskyi district, near the village of Huty-

Dzikunsky and in the village of Kryvali, where they each year made glass products for 4000 rubles in total. In the early 1850s there were already 27 workshops with 440 workers, where goods for 60000 rubles were produced [4, p. 95; 12, pt. II, p. 41].

This group of industries included also enterprises for the production of smoking pipes, tiles, vitriol, lime, millstones etc. The total value of goods produced in the Right-Bank Ukraine from mineral raw materials amounted to 430000 rubles, or 6% of the value of local products produced by industry. The first place in terms of production was taken by Kyivskiy district with the city of Kyiv (Table 1).

In 1846, 1562 industrial enterprises worked in the Kyiv, Volyn and Podillia provinces, of which 86% were in rural areas [68, p. 25]. The total industrial production of the Right-Bank Ukraine in the late 1840s approached 8204380 rubles (Table 1). In the 1860s, it grew 2,8 times, mainly due to an increase in sugar production [6, p. 23].

#### **4. Intra-regional model of the industrial production organization**

Extensive statistical material presented in Table 1, allowed construction a spatial model of the structural organization of industrial production of Right-Bank Ukraine in the middle of the 19-th century. Extensive statistical material presented in Table 1 allowed us to build a spatial model of the structural organization of industrial production of the Right Bank Ukraine in the mid-nineteenth century, using data from 36 counties and 3 provinces and the possibility of multidimensional cluster analysis. There were 5 macrogroups of objects, organized by specialization in one of the industries, a combination of several or no clear specialization at all (Table 2; Figure 1). Consider them in descending order of specialization.

Macrogroup A (Table 2; Figure 1; 2). It includes 7 districts of the northern part of region with a population of 799600. A characteristic feature of their economy was the receipt of 85,8% of industrial profits from the processing of livestock products.

Macrogroup E (Table 2; Figure 1; 2). It united 14 districts, mainly in the southern zone of the Dnieper Right- Bank, with a population of 1616370. It is characterized by in-depth specialization in the plant origin products processing, from which 96,7% of industrial profits were received.



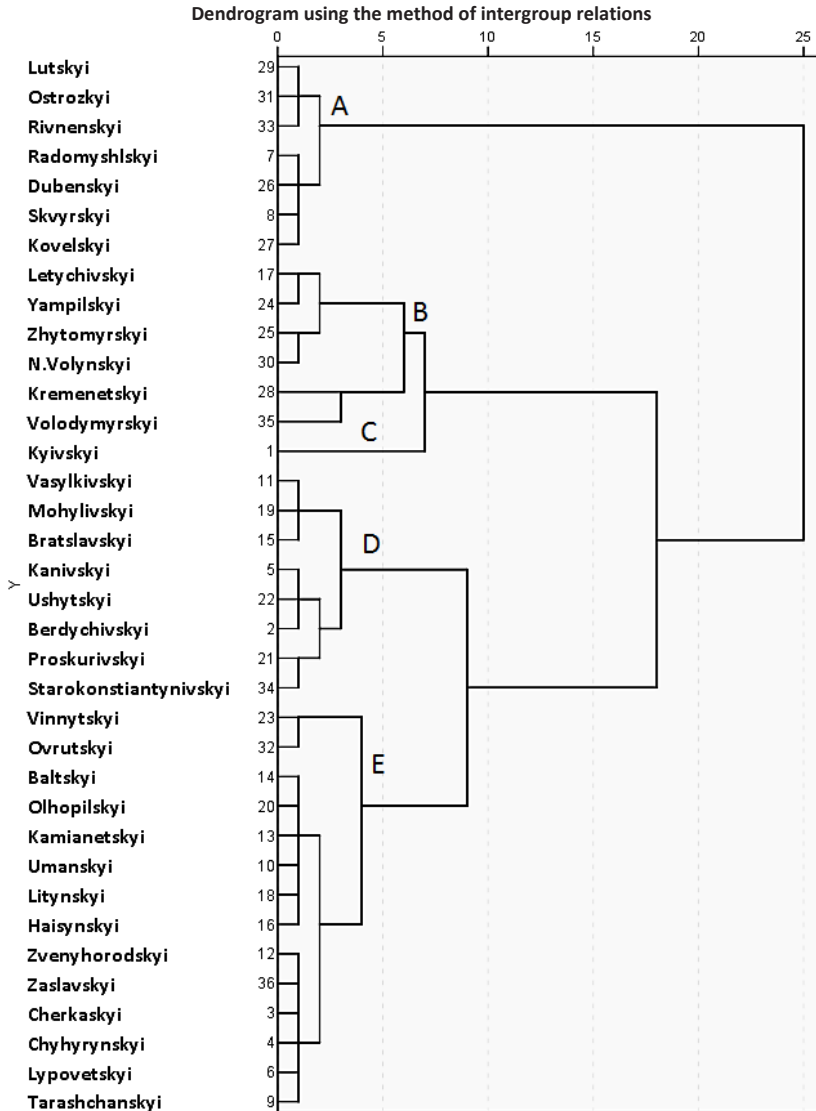


Figure 1. The Right-Bank Ukraine districts cluster classification by industries' profit share

Macrogroup C (Table 2; Figure 1; 2). It is represented by only one district of Kyiv with the central regional city of Kyiv with a total population of 176280. Unlike all other territories, 76,5% of industrial profits here came from the processing raw materials of mineral origin.

Macrogroup D (Table 2; Figure 1; 2). It united 8 districts in the south of the Right-Bank with a population of 1090600 and natural conditions equally suitable for crop and livestock production. Hence the balanced nature of the processing industry and revenues from it – 48,5% processing of crop products and 44,5% processing of livestock products.

Macrogroup B (Table 2; Figure 1; 2). It includes 6 districts with a population of 816350, which farms did not show narrow industrial specialization: 26,1% of industrial profits came from the processing of plant

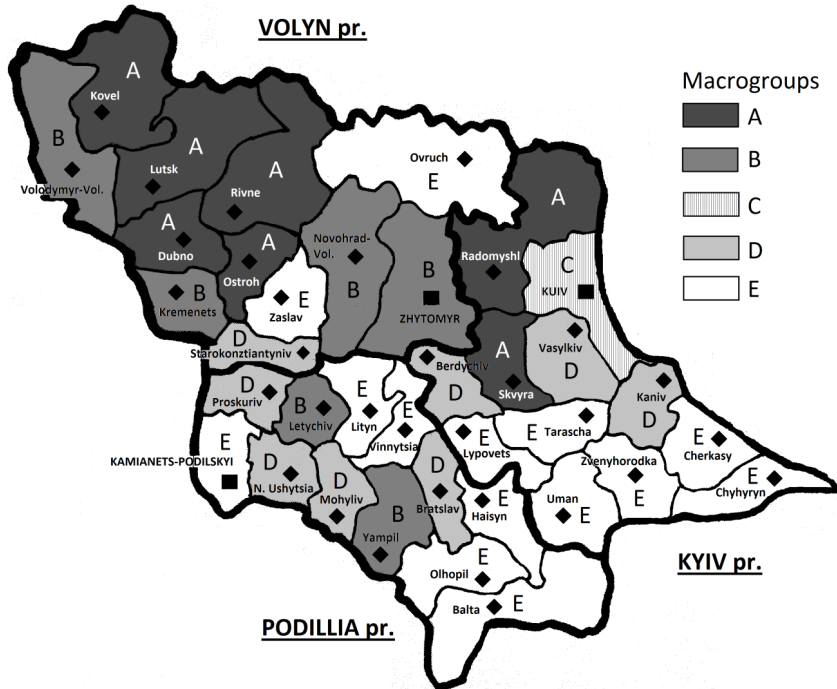


Figure 2. Cartogram of the Right-Bank Ukraine intra-regional industrial specialization in the mid-19th century

## Districts classification results by industries' profit share

Provinces / districts	Industries and production amounts in rubles (Profit share by industries %)						Total
	1. Processing crop products	%	2. Livestock processing	%	3. Manufacture of mineral products	%	
<b>Macrogroup A</b>	<b>68170</b>	<b>12,3</b>	<b>475775</b>	<b>85,8</b>	<b>10345</b>	<b>1,9</b>	<b>554290</b>
Lutskiyi	0	0	81510	100	0	0	81510
Ostrozkyi	0	0	52700	100	0	0	52700
Rivnenskyi	10995	7,7	131075	91,7	825	0,6	142895
Radomyshl'skyi	34880	22,3	114100	73,1	7150	4,6	156130
Dubenskyi	9280	22,0	32550	77,1	400	0,9	42230
Skvyrskyi	12500	16,6	60800	80,8	1970	2,6	75270
Kovelskyi	515	14,5	3040	85,5	0	0	3555
<b>Macrogroup B</b>	<b>69802</b>	<b>26,1</b>	<b>89657</b>	<b>33,6</b>	<b>107665</b>	<b>40,3</b>	<b>267124</b>
Letychivskyi	8975	46,6	1490	7,7	8800	45,7	19265
Yampil'skyi	3380	38,3	1456	16,5	4000	45,3	8836
Zhytomyr'skyi	11200	20,6	15820	29,1	27403	50,4	54423
N.Volyn'skyi	36467	31,3	33428	28,7	46507	40,0	116402
Kremenetskyi	9420	16,3	32550	56,4	15715	27,2	57685
Volodymyr'skyi	360	3,4	4913	46,7	5240	49,8	10513
<b>Macrogroup C</b>	<b>43130</b>	<b>1,7</b>	<b>555600</b>	<b>21,8</b>	<b>1948802</b>	<b>76,5</b>	<b>2547532</b>
Kyivskyi	43130	1,7	555600	21,8	1948802	76,5	2547532
<b>Macrogroup D</b>	<b>422865</b>	<b>48,5</b>	<b>387684</b>	<b>44,5</b>	<b>60695</b>	<b>7,0</b>	<b>871244</b>
Vasylkivskyi	77950	60,8	50250	39,2	0	0	128200
Mohylivskyi	23865	62,5	13220	34,6	1100	2,9	38185
Bratslavskyi	31700	72,1	12000	27,3	240	0,5	43940
Kanivskyi	183890	43,8	206900	49,3	29300	7,0	420090
Ushytskyi	17720	40,5	22021	50,3	4027	9,2	43768
Berdychivskyi	47715	50,3	45668	48,1	1490	1,6	94873
Proskurivskyi	21405	37,3	23594	41,1	12390	21,6	57389
Starokonstantynivskyi	18620	41,6	14031	31,3	12148	27,1	44799
<b>Macrogroup E</b>	<b>3833555</b>	<b>96,7</b>	<b>73534</b>	<b>1,9</b>	<b>57108</b>	<b>1,4</b>	<b>3964197</b>
Vynnytskyi	53287	71,0	3851	5,1	17959	23,9	75097

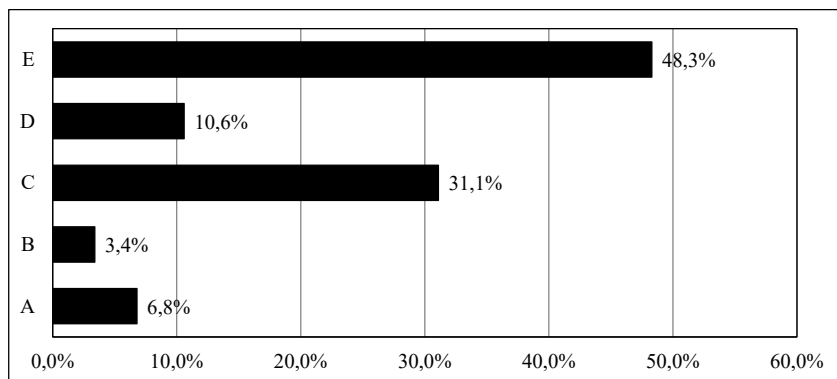
(End of Table 2)

Provinces / districts	Industries and production amounts in rubles (Profit share by industries %)						Total
	1. Processing crop products	%	2. Livestock processing	%	3. Manufacture of mineral products	%	
Ovrutskyi	13446	62,4	3370	15,7	4716	21,9	21532
Baltskyi	128144	87,0	19200	13,0	0	0	147344
Olhopilskyi	14400	88,8	1820	11,2	0	0	16220
Kamianetskyi	103744	90,3	9968	8,7	1200	0	114912
Umanskyi	52370	83,9	10050	16,1	0	0	62420
Litynskyi	66219	82,0	13170	16,3	1375	1,7	80764
Haisynskyi	40100	78,5	10605	20,8	358	0,7	51063
Zvenyhorodskyi	80000	100	0	0	0	0	80000
Zaslavskyi	468100	99,7	1500	0,3	0	0	469600
Cherkaskyi	2153220	99,6	0	0	9170	0,4	2162390
Chyhyrnytskyi	556000	98,2	0	0	10100	1,8	566100
Lypovetskyi	38250	91,4	0	0	3580	8,6	41830
Tarashchanskyi	66275	88,5	0	0	8650	11,5	74925
<b>Right-Bank Ukraine</b>	<b>4437522</b>	<b>54,1</b>	<b>1582250</b>	<b>19,3</b>	<b>2184615</b>	<b>26,6</b>	<b>8204387</b>

products, 33,6% from the processing of animal products, 40,3% from the processing of mineral raw materials.

Thus, the farms of the territories included in macrogroups A, C, E, for the most part were tended to a certain industrial specialization, a fact in itself interesting and previously almost unknown. In the territories of macrogroup B, the complex nature of the processing industry does not allow us to speak of any distinct specialization. In the areas of macrogroup D, the owners of the estates tried to combine the advantages of both branches of industrial processing of agricultural products, based on favorable natural conditions. This determines the intermediate position of this macrogroup in our classification between clusters with specialized and non-specialized farms.

In conclusion, we will try to determine the market orientation of an industrial specializations and their economic potential. To do this, we



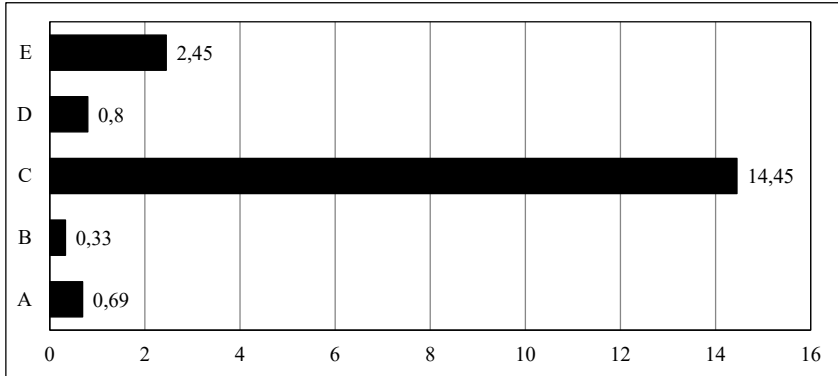
**Figure 3. The share industrial profit of districts' cluster groups from the total industry profit in the Right-Bank Ukraine (1845–1847)**

compare two diagrams based on the same data (Table 1), but on different indicators.

In the first case (Figure 3) the share of industrial profit of cluster groups from the total industrial profit of the Right-Bank Ukraine was used. The most market-oriented are group E farms, which were specialized in processing crop products. The second place takes group C (the Kyiv district), which was specialized in mineral processing, as well as metalworking and mechanical engineering in Kyiv city. The third position is occupied by groups D and A, which specialized in the industrial processing of livestock products, sometimes in combination with the processing of crop products (group A). Finally, group B, which had sporadic links to the market, closes this series.

Another version of the analysis involves the calculation of profit from industrial activity per capita in cluster macrogroups' areas (Figure 4).

So, we clearly see a well-known trend: an industry based solely on the processing of agricultural products, especially handicrafts, will always lose out to more advanced industries. We should also keep in mind that, following the tradition of 19th-century economic statistics, we did not include in group A profits revenues from distilling, which were usually attributed to grain trade, and local sugar production will be started to flourish only in the late 50s and early 60s years of the 19-th century. Otherwise, the difference in profit between groups C and E would be less significant.



**Figure 4. Industrial profit per capita of districts' cluster groups (in rubles)**

Industrial processing of agricultural products (mainly of animal origin) in groups D and A shows signs of marketability, but most likely not beyond the local market. Industrial production of farms in the cluster group B is more characteristic of the feudal type of management.

### Conclusions

The industrial branches of the economy were a continuation of agriculture, since they often engaged in the processing of crop and livestock products, and a significant number of the factories themselves were in the estates and based on the work of dependent peasants. The locomotive of the industrial processing of crop production in the middle of the 19-th century there was sugar factoring. In the Kyiv province the cost of a sugar plant amounted to 85-145 thousand rubles and all sugar factories were valued at 3172000 rubles. They produced almost 277 thousand poods of sugar over the season, making owners 418 thousand rubles net profit. Other products of industrial processing of crop production were significantly lower than sugar in value, but the gross output of this industry in 1845–1848 amounted to 4738600 rubles, or 57,8% of the Right-Bank Ukraine industrial production. Industrial processing of livestock products was best represented by weaving factories. In 1853, at a total of 128 enterprises, a woolen cloth worth 1370000 rubles was made. An important role was

played by the manufacture of leather. These enterprises demonstrated an annual output of 700 thousand rubles. The annual production of animal fat, greasy candles, soap and wax was estimated at about 500 thousand rubles. The gross output of livestock processing enterprises on the Right Bank was approaching 1582250 rubles. Other types of industry (metallurgy and metal processing, manufacturing of bricks and other building and decoration materials, faience and porcelain manufactories, glass mills, etc.) at the end of the 1840s had an annual output of 2184600 rubles. The total industrial production of the Right Bank Ukraine at the end of the 1840s was approaching 8204380 rubles (54,1% of the processing of crop products, 26,6% of mineral raw materials, 19,3% of animal products). Of these, 78,1% belonged to the Kyiv province, 13,4% to the Volyn and only 8,4% to the Podillia. The use of various groups of sources, primarily descriptive and statistical, allowed us not only to get acquainted with the development of industry of the Right-Bank Ukraine in the middle of the 19-th century, but to propose for the first time a statistical model of this phenomenon. We consider this analytical construction as a tool for assessing trends and levels of local production through intra-regional specialization and market relations. The macrogroup A (7 districts) received 85,8% of industrial revenues from the processing of livestock products. Macrogroup E (14 districts) was characterized by in-depth specialization in the plant origin products processing, from which 96,7% of industrial profits were received. Macrogroup C (the Kyiv district) 76,5% of industrial profits were obtained from the processing raw materials of mineral origin. Macrogroup D (8 districts) demonstrated balance of the processing industry and revenues from it – 48,5% of crop products and 44,5% of livestock products. Macrogroup B (6 districts) did not have a narrow production specialization: 26,1% of industrial profits came from processing of plant products, 33,6% from processing of livestock products, 40,3% of industrial profits from processing of minerals. The production of groups C and E showed the greatest market orientation, groups A and D met the needs of the surrounding areas, the organization of production in the estates of the group B areas was more reminiscent of the feudal.

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