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FACTORS OF FORMATION AND DEVELOPMENT THE SYSTEM OF POPULATION TRADING SERVICE IN KHARKIV REGION

The article is devoted to determination the factors of formation and development the system of population trading service in Kharkiv region. For identifying these factors the method of factor analysis was chosen. The aim of the factor analysis is to reduce a number of investigated parameters and to analyze relationships between them. The initial database served 91 indicators, which describes demographic, social, economic and environmental characteristics of the region. Determining a number of factors was carried out based on three criteria: Kaiser criterion, cumulative percentage, Cattell "scree" criterion. The most optional were identified 5 factors which can be interpreted as: socio-economic, agro-resettlement (agro-ecistic), housing and commercial, socio-demographic, ecological. The factor weights were calculated for each factor within cities of regional subordination and districts to assess the effect degree of the factor in a certain administrative-territorial unit. The greatest effect of socio-economic, agro-resettlement, housing and commercial factors is characterized for the city of Kharkiv, cities of regional subordination and districts located around the regional center. Socio-demographic factor is manifested the best in administrative-territorial units with favorable demographic situation, high share of the main population age group. Ecological factor operates in districts and cities, where environmentally "dirty" enterprises work.

Key words: system of population trade service, district, city of regional subordination, factor analysis, factor, factor weights, variance.

Павло Кобилін. ФАКТОРИ ФОРМУВАННЯ ТА РОЗВИТКУ СИСТЕМИ ТОРГОВЕЛЬНОГО ОБСЛУГОВУВАННЯ НАСЕЛЕННЯ ХАРКІВСЬКОЇ ОБЛАСТІ

Стаття присвячена виявленню факторів формування і розвитку системи торговельного обслуговування населення Харківської області. Обгрунтовано сутність факторного аналізу, критерії виділення факторів. За результатами факторного аналізу виділено 5 факторів, що впливають на рівень розвитку системи торговельного обслуговування населення Харківської області: соціально-економічний, аграрно-розселенський (аграрно-екістичний), житлово-торговельний, соціальнодемографічний, екологічний. Проаналізовано дію виділених факторів у розрізі міст обласного підпорядкування та районів області.

Ключові слова: система торговельного обслуговування населення, район, місто обласного підпорядкування, факторний аналіз, фактор, факторні ваги, дисперсія.

Павел Кобылин. ФАКТОРЫ ФОРМИРОВАНИЯ И РАЗВИТИЯ СИСТЕМЫ ТОРГОВОГО ОБСЛУЖИВАНИЯ НАСЕЛЕНИЯ ХАРЬКОВСКОЙ ОБЛАСТИ

Статья посвящена выявлению факторов формирования и развития системы торгового обслуживания населения Харьковской области. Обоснованы сущность факторного анализа, критерии выделения факторов. По результатам факторного анализа выделено 5 факторов, влияющих на уровень развития системы торгового обслуживания населения Харьковской области: социально-экономический, аграрно-расселенческий (аграрно-экистический), жилищно-торговый, социально-демографический, экологический. Проанализировано действие выделенных факторов в разрезе городов областного подчинения и районов области.

Ключевые слова: система торгового обслуживания населения, район, город областного подчинения, факторный анализ, фактор, факторные веса, дисперсия.

Introduction. In current conditions the system of population trading service is one of the most profitable sectors of the economy developing rapidly: new forms of population trading service and new trading formats are appearing, assortment of goods is increasing, new domestic and foreign business structures in the market are entering.

At the same time negative trends of this branch development are being observed, in particular, a number of retail trade, restaurant industry enterprises is reducing, volume of retail trade turnover of enterprises is decreasing, territorial disparities in the distribution institutions of the system of population trading service are deepening, especially in rural areas.

Elimination negative development trends of the system of population trading service is impossible without depth study and identification factors affecting its formation and development. Analysis of these factors will make it possible to identify causes and problems of the

system of population trading service, propose measures to address them, suggest directions for further more optimal development of the system of population trading service in the region.

Analysis of previous studies. Humangeographical aspects of the development system of population trading service were covered in the works of many Ukrainian and foreign scientists, including M. Baranovski [1], V. Doroshenko [3] S. Zhovnir [4] I. Zapototska [5] E. Kalmuska [6] K. Niemets, L. Niemets, A. Kornus [7] M. Malska [9], A. Mamchur [10], I. Osipchuk [13], P. Chernomaz [16], P. Guimaraes [18], P. Sjoholt, B. Dale [17], D. Sokolowski [19], D. Szymańska, Murawska [20] and others, who studied various its aspects, based on examples of different regions and countries, including Moldova, Poland, Norway, Portugal, Ukraine (Chernihiv, Khmelnytsky, Vinnytsia, Cherkasy, Sumy, Lviv, Rivne regions). Thus, functional and

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component, territorial, managerial structures of the social sphere and its components - trading and consumer complexes, market infrastructure, etc. were examined by the mentioned researchers. Sociological surveys were conducted regarding quality of the trading service in regions, regularity using of shopping centers by the population, their motives visits, users habits. Using factor analysis the factors were determined affecting the territorial organization of consumer and trading complexes, mobile forms of public service, service consumption. Based on using cluster analysis the grouping of administrative-territorial units was carried out by the degree of similarity level of the trading activities development. The luxury shops, shopping centers, their territorial differentiation, structure, provision of them by population centers were characterized, typization centers of population service was developed in some works.

Human-geographical research of the system of population trading service in Kharkiv region were considered in A. Golikov, N. Kazakova, M. Shuba's [2], I. Tarasova, K. Kalyenik's [15], A. Krutova, A. Nesterenko's [8] works who analyzed the state and trends development of restaurant industry and retail trade institutions, its number, dynamics and structure, common problems of the branch was investigated, territorial analysis of the development retail trade and restaurant industry was made.

Despite considerable theoretical achievements of previous studies the system of population trading service in different Ukraine's regions, including Kharkiv region, issues of identifying formation and development factors of this system using modern methods of multivariate statistical analysis remains unresolved, which allow studying all questions about providing population by services comprehensively, fully, optimizing them.

The aim of the publication is to identify formation and development factors of the system of population trading service in Kharkiv region.

Setting tasks. According to the aim of the publication the follow tasks were set: to describe the method of factor analysis; to identify factors of formation and development of the system of population trading service in Kharkiv region; to analyze expression of the extracted factors within administrative-territorial units of the region.

Research methods. For determination and analysis factors affecting the formation and development of the system of population trading service in Kharkiv region, the factor analysis (principal components method with varimax factors rotation) was used which allows conducting reduction a number of parameters and providing research of relationships between them [12]. Execution factor analysis involves selection of statistical indicators influencing the formation and development of the system of population trading service in the region within cities of regional subordination and districts of Kharkiv region, determination the optimal number of factors based on the following criteria:

• the Kaiser criterion: only factors with variance greater than 1 are selected. If a factor doesn't extract

variance equal to at least variance of one indicator, it is not taken into account;

- by a cumulative percentage: those factors are selected which cover approximately three-quarters of the initial information, i.e. the cumulative percentage should be more 75%;
- the Cattell "scree" criterion: on the variances graph (scree plot) the place is determined where the variance reduction slows at most [11].

Based on varimax rotation of coordinates axes the matrix of factor loadings were obtained. The factors includes indicators with the largest factor loading and the closest by the modulo to 1. If factor loadings of the indicator for each of the selected factors less than 0.7 ("threshold" value), this indicator is not included in the analysis due to its statistical insignificance. The next step of the research is interpretation of the study results of the factor analysis and giving semantic characteristic to the selected hypothetical factors influencing the formation and development of the system of population trading service in the region. For identifying factors within cities of regional subordination and districts of the region the factor weight have been calculated - indicators characterizing contributions of administrativeterritorial units of the region in each of factors.

If the value of factor weights value is around 0, the influence of this factor corresponds impact for the whole region, if it is higher (in particular more than 1) – the impact of this factor is significantly larger, in case of more than -1, the parameter is significantly smaller than in the region on the whole [11].

The main part. For the research 91 indicators were selected, which includes demographic, economic, social and environmental characteristics of cities of regional subordination and districts of Kharkiv region in 2015 which have impact on the development the system of population trading service in the region.

For determination optimal number of factors the calculating variance of each factor was made. By the Kaiser criterion 11 factors of formation and development of the system of population trading service in Kharkiv region were highlighted; by the cumulative percentage – 3 factors (Table 1); by the Cattell "scree" criterion – 4-5 factors (Fig. 1). Therefore, we consider the most optimal highlighting 5 factors of formation and development of the system of population trading service in Kharkiv region.

Based on the calculated values of factor loadings the factors content were set affecting the formation and development of the system of population trading service in Kharkiv region in 2015. Based on the analysis of calculations results it was revealed that 23 indicators from 91 have factor loading less than the threshold, so they didn't used in the analysis. The first factor explains 51.8% of the total variance of the output data, the second – 9.9%, it gives us to consider these two factors as main ones.

Interpretation of factor analysis results enabled identifying the following hypothetical factors:

1) *socio-economic*, includes 52 indicators, in particular: number of residents, persons; number of secondary

educational institutions, units; grants for reimbursement for housing and communal services, thousand UAH; number of EDRPOU subjects, units; amount of capital investment in housing, mln. USD.; transportation of goods by automobile transport, thousand tons; number of enterprizes, units; volume of sales (goods and services) (excluding VAT and excise), mln. UAH and other indicators;

- 2) agro-resettlement (agro-ecistic), covers the following parameters: land area, km2; share of urban population, %; share of rural population,%; number of men per 1,000 women, persons; the number of villages, units; agricultural land at the end of the year, thousand ha; sales of cereals and legumes by agricultural enterprises, tons; sales of sunflower seeds by agricultural enterprises, tons;
- 3) housing and commercial, contains the following

- indicators: a number of towns, units; housing commissioning per 1000 population, m2; volume of sales (goods and services) (excluding VAT and excise tax) per capita, UAH;
- 4) *socio-demographic*, it characterized by the following indicators: general population death rate, ‰; rate of population natural increase (decrease), ‰; the number of pensioners per 1000 population, ‰;
- 5) *ecological*, includes the following parameters: emissions of pollutants into the atmosphere from stationary sources of pollution per capita, kg; volume of waste at the end of the year, t.

Based on results of the factor analysis factor weights were calculated for each hypothetical factor within administrative-territorial units of the Kharkiv region in 2015. Territorial differentiation of values of operating factors is observed, but ordered spatial structures hve not been identified.

Table 1

Absolute, relative and cumulative values of variance of formation and development factors of the system

of population trading service in Kharkiv region, 2015 (constructed by the author based on results of factor analysis)

Factor	Variance	Percentage of total	Cumulative	Cumulative
		variance, %	variance	percentage, %
1.	53,6631	58,9704	53,6631	58,9704
2.	8,6403	9,4948	62,3033	68,4652
3.	6,1334	6,7400	68,4368	75,2052
4.	4,0570	4,4582	72,4938	79,6635
5.	2,7117	2,9799	75,2055	82,6434
6.	2,5383	2,7894	77,7438	85,4328
7.	2,4015	2,6390	80,1453	88,0717
8.	1,6657	1,8305	81,8110	89,9022
9.	1,4092	1,5486	83,2203	91,4508
10.	1,3593	1,4937	84,5796	92,9446
11.	1,1456	1,2589	85,7251	94,2034
12.	0,9406	1,0336	86,6658	95,2371
13.	0,8299	0,9120	87,4957	96,1491
14.	0,6681	0,7342	88,1638	96,8833
15.	0,5053	0,5552	88,6691	97,4385
16.	0,4671	0,5133	89,1362	97,9518
17.	0,3657	0,4019	89,5019	98,3537
18.	0,2614	0,2873	89,7633	98,6410
19.	0,2340	0,2572	89,9973	98,8981
20.	0,2071	0,2276	90,2044	99,1257
21.	0,1463	0,1608	90,3508	99,2865
22.	0,1235	0,1357	90,4742	99,4222
23.	0,1106	0,1215	90,5848	99,5438
24.	0,0917	0,1007	90,6765	99,6445
25.	0,0807	0,0887	90,7572	99,7332
26.	0,0743	0,0817	90,8315	99,8149
27.	0,0481	0,0528	90,8796	99,8677
28.	0,0398	0,0438	90,9194	99,9114
29.	0,0302	0,0332	90,9496	99,9446
30.	0,0186	0,0205	90,9682	99,9651
31.	0,0141	0,0155	90,9824	99,9806
32.	0,0123	0,0135	90,9946	99,9941
33.	0,0054	0,0059	91,0000	100,0000

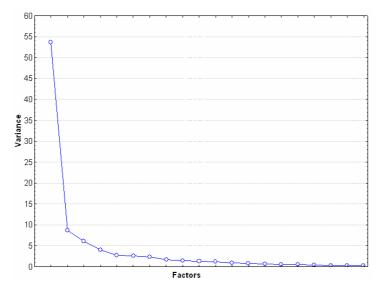


Fig. 1. The variance graph ("scree") of formation and development factors of the system of population trading service in Kharkiv region, 2015 (constructed by the author based on results of factor analysis)

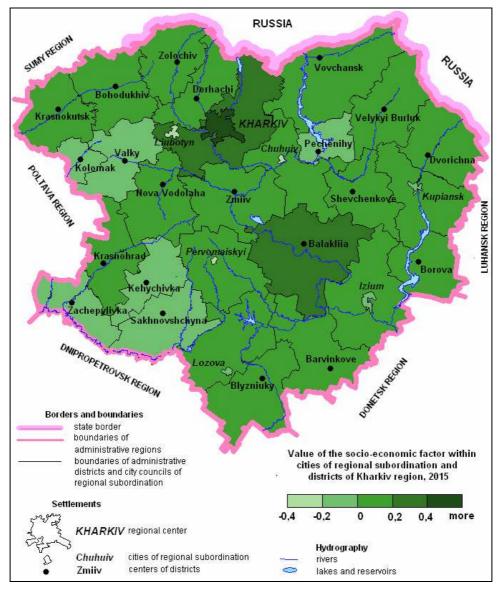


Fig. 2. Socio-economic factor within cities of regional subordination and districts of Kharkiv region, 2015 (constructed by the author based on results of factor analysis)

The most active influence of the *socio-economic* factor is observed in the city of Kharkiv and Kharkivs'kyi district (fig. 2), accounted for the largest concentration objects of social and economic activities in the regional center, as well as in industrialized Balakliys'kyi district. The great values of this factor are also characterized for the districts surrounding the city of Kharkov (Vovchans'kyi, Zmiyivs'kyi, Derhachivs'kyi), and districts where cities of regional subordination are located (Iziums'kyi, Pervomais'kyi, Kupyans'kyi). The peripheral districts and cities with unfavorable socioeconomic indicators do not have an extensive network of trading objects and restaurant industry institutions.

The agro-resettlement factor is inverse, it manifests the most strongly in the cities of regional subordination and highly urbanized districts (Fig. 3), since cities and districts with predominance of urban population have the most developed system of population trading service (cities Izium, Chuhuiv, Chuhuyiv, Kupiansk, Lozova, Pervomaiskyi, Liubotyn, Kharkiv, Derhachivs'kyi, Pecheniz'kyi districts, etc.). The smallest value of factor weights are characterized for Iziums'kyi, Pervomais'kyi, Blyzniukivs'kyi, Kupyans'kyi districts where predominate rural population.

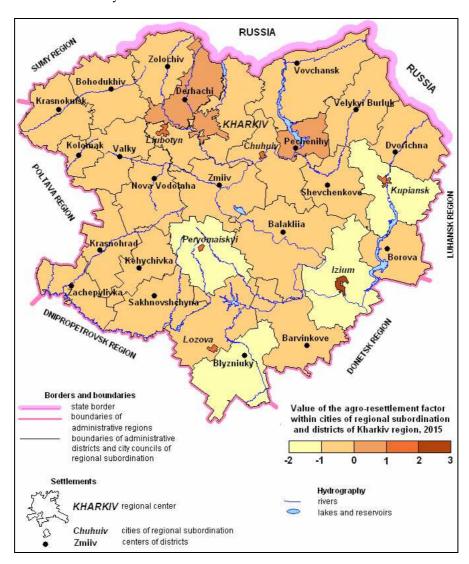


Fig. 3. Agro-resettlement (agro-ecistic) factor within cities of regional subordination and districts of Kharkiv region, 2015 (constructed by the author based on results of factor analysis)

The housing and commercial factor has the greatest impact in the districts surrounding the city of Kharkov – Kharkivs'kyi, Derhachivs'kyi, Chuhuivs'kyi, Vovchans'kyi. These districts, which constitute the suburbs of the regional center, are attractive for people moving for permanent residence, building or buying housing, starting business, rent of premises, etc. Action of this factor has the least impact in Sakhnovshchyns'kyi, Zachepylivs'kyi, Kolomats'kyi, Dvorichans'kyi,

Borivs'kyi, Krasnokuts'kyi districts which are the most distant from the regional center, characterized by predominance of the rural population, they are less attractive for buying housing, starting business, etc. (Fig. 4).

The socio-demographic factor appears most strongly in cities of regional subordination and districts with relatively favorable demographic situation, high share of the population from the main age group (15-64 years). At the same time it is characterized by low share of eld-

erly people (65 and older), on the one hand, it provides high labor resource potential of territory, on the other hand – makes little demographic burden on people of

working age. It concerns Kehychivs'kyi, Krasnohrads'kyi, Zachepylivs'kyi, Sakhnovshchyns'kyi districts, the city of Chuhuiv, etc. (fig. 5).

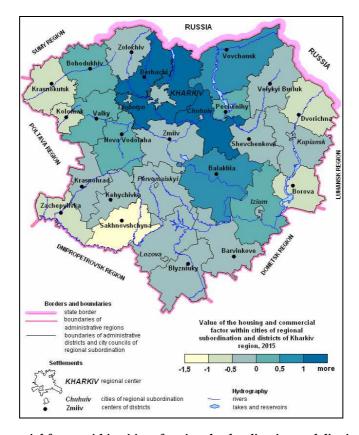


Fig. 4. Housing and commercial factor within cities of regional subordination and districts of Kharkiv region, 2015 (constructed by the author based on results of factor analysis)

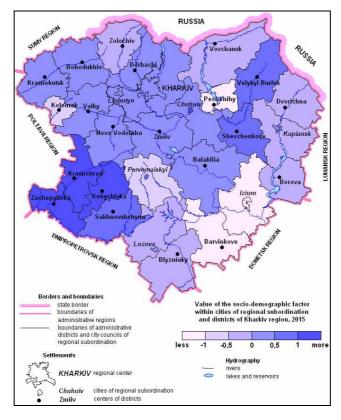


Fig. 5. Socio-demographic factor within cities of regional subordination and districts of Kharkiv region, 2015 (constructed by the author based on results of factor analysis)

The greatest effect of the *ecological factor* is manifested in districts and cities, where are situated environmentally "dirty" industrial enterprises – Zmiyivs'kyi, Balakliys'kyi, Krasnohrads'kyi, Vovchans'kyi districts, cities of Lozova, Izium, Kupiansk (Fig. 6).

The lowest effect of the factor is shown in Pecheniz'kyi, Novovodolaz'kyi, Blyzniukivs'kyi, Barvinkivs'kyi districts which are specialized in agriculture.

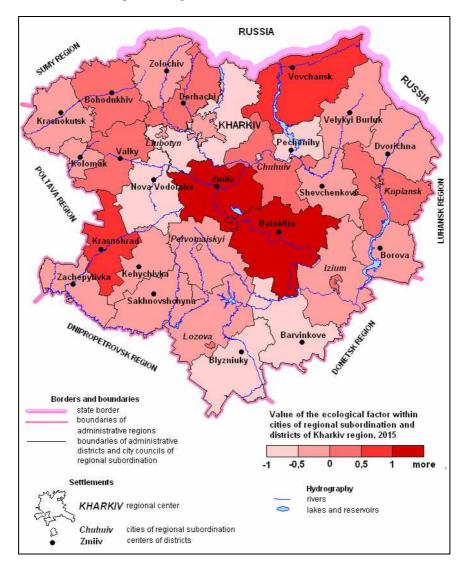


Fig. 6. Ecological factor within cities of regional subordination and districts of Kharkiv region, 2015 (constructed by the author based on results of factor analysis)

All highlighted factors are internal by the direction of impact, they reflect influence of social, economic, demographic and environmental characteristics of cities and districts of the region on the system of population trading service of Kharkiv region. At the same time, external factors affect the state of the system, these are neighborhood of Kharkiv region with area of conducting antiterrorist operation in Donbass region, and occurrence a number of settlements of the region to it (the city of Izium and the whole Iziums'kyi district, consisting of 60 villages) [14].

Conclusions. Identifying factors of formation and development of the system of population trading service in Kharkiv region was carried out by the factor analysis, which involves reducing a number of investigated parameters and studying relationships between them. For

analysis 91 indicators were selected characterizing socioeconomic characteristics of the Kharkiv region. Application this method enabled highlighting five factors: socioeconomic, agro-resettlement (agro-ecistic), housing and commercial, socio-demographic, ecological. Based on calculations total variance of the output data the main ones were defined socio-economic and agro- resettlement factors. For justification the degree of the factor effect in each administrative-territorial unit of the region the factor weights were calculated. The action of these factors are mostly appeared in the highly urbanized districts with the significant level of socio-economic development, which have a favorable position regarding to the regional center and a large number of industrial enterprises (Derhachivs'kyi, Kharkivs'kyi, Chuhuivs'kyi, Balakliys'kyi districts).

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