INCREASING THE ATTRACTIVENESS OF MEGAPOLISES: OPPORTUNITIES FOR REGULATING THE ECOLOGICAL SITUATION IN URBANIZED TERRITORIES

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ABSTRACT

Objective: The modern citizen is becoming more demanding of the urban environment. When choosing a place to live, people pay attention not only to the availability of housing, and job vacancies, but also, in general, to the level and quality of life in the city. **Method:** The authors propose a methodology for analyzing the attractiveness of cities based on the calculation of integral indices for the attractiveness of the territory and its management and regulation. The approbation of this methodology was carried out based on a comparative analysis of Russian cities with a population of more than 1,000,000 people based on 40 indicators. **Results:** As a result of the conducted study, general and specific problems of cities have been identified and measures to increase their attractiveness have been proposed. **Conclusions:** Authors examined the content of the category "attractiveness of the territory" and its defining parameters.

Keywords: Attractiveness of the territory; Comfort of the city; City management; Quality of life; Sustainable development.

AUMENTANDO A ATRATIVIDADE DAS MEGAPOLIS: OPORTUNIDADES PARA REGULAR A SITUAÇÃO ECOLÓGICA EM TERRITÓRIOS URBANIZADOS

RESUMO

Objetivo: O cidadão moderno está cada vez mais exigente com o ambiente urbano. Ao escolher um lugar para morar, as pessoas atentam não apenas para a disponibilidade de moradia e vagas de emprego, mas também, em geral, para o nível e a qualidade de vida na cidade. **Método:** Os autores propõem uma metodologia de análise da atratividade das cidades a partir do cálculo de índices integrais de atratividade do território e sua gestão e regulação. A aprovação desta metodologia foi realizada com base em uma análise comparativa de cidades russas com população superior a 1.000.000 de pessoas com base em 40 indicadores. **Resultados:** Como resultado do estudo realizado, foram identificados problemas gerais e específicos das cidades e propostas medidas para aumentar sua atratividade. **Conclusões:** Os autores examinaram o conteúdo da categoria "atratividade do território" e seus parâmetros definidores.

Palavras-chave: Atratividade do território; Conforto da cidade; Gestão da cidade; Qualidade de vida; Desenvolvimento sustentável.

1 INTRODUCTION

In the context of economic globalization, competition between cities for high-quality human resources is intensifying, as the most professional individuals leave less developed cities, rushing to where there are more opportunities for self-realization. Thus, one can observe an active migration of the population between cities. There are several other, no less significant reasons that are a consequence of the movement of the population between cities. More attractive cities in terms of the quality of the urban environment are more popular. This is confirmed by international ratings published annually, such as the Anholt-Ipsos City Brand Index 2020, The World's 100 Best Cities, and others that evaluate million-plus cities by various parameters. London, Paris, New York, Sydney, etc. occupy leading positions in almost all ratings. Of the Russian cities in the ratings, Moscow and St. Petersburg are considered, which are not much inferior to the leaders. An interesting question for the study is the comparison of other million-plus cities in Russia with these cities.

One of the important components of the quality of the urban environment is the comfort of living in a certain area. This is a capacious concept that includes the development of infrastructure, the availability of park areas, the convenience of the location of socio-cultural, sports facilities, as well as shops, pharmacies, and other facilities. In addition, people evaluate the environmental situation in the city, such as

the quality of air, water, the absence of pollutants, etc., as it all affects the health of the population. Thus, it becomes obvious that where the municipal authorities will provide the most advantageous living conditions for their citizens, this territory will be more attractive and competitive.

Such authors as L. Wirth (1938), C. Montgomery (2013), M. Kohout and J. Kopp (2020), S. Nickayin et al. (2020), J. Kozamernik et al. (2020), I. Ibrahim (2020), and S. Dutta et al. (2020) describe the essential importance of developing the quality of the urban environment in terms of increasing the attractiveness of the territory for people's life. A more detailed description of the composite criteria for the attractiveness of the territory is presented in the works of R.V. Fattakhov et al. (2019), C. Rainero and G. Modarelli (2020), C. De Lucia et al. (2021), and E.A. Stryabkova et al. (2021). E. Bielińska-Dusza and M. Hamerska (2021), K. Kourtit and P. Nijkamp (2016), F. Sinatra et al. (2021), and K. Kimic and K. Ostrysz (2021) also made a significant contribution to the development of methodological approaches to assessing the level of attractiveness of the territory for people's lives.

The problems of urban crises and the possibilities of helping their growth and increasing their comfort are discussed in the works of J. Jacobs, who became a classic of modern urbanism. In her book "The death and life of great American cities" (Jacobs, 1961), she "identifies four essential conditions for generating diversity and active social life in cities", which can make the city more convenient and attractive for living.

2   METHODS

The design strategy of our study was based on a mixed approach and included quantitative and qualitative methods of collecting information. The main method of information processing was the methodology for assessing the attractiveness of cities developed by us. The main reason for the development of this methodology was the lack of an optimal developed unified approach to assessing the attractiveness of territories in Russia, in particular cities. From our point of view, to analyze the attractiveness of the urban environment for residents, an integrated approach is needed, reflecting the key components necessary for a comfortable life in the city.

For the analysis, we selected five million-plus cities of modern Russia, which mainly compete with each other in terms of attractiveness for the population, namely Kazan, Yekaterinburg, Perm, Nizhny Novgorod, and Samara. To date, increasing the city attractiveness for residents of selected cities is considered one of the important management tasks of the municipal authorities: to provide the highest quality living

conditions. These goals are reflected in many strategic documents and municipal urban improvement programs. Thus, it is important to carry out monitoring to assess the level of attractiveness of the cities selected for the study and to identify the weaknesses of cities for the development of operational management solutions for their improvement.

For this, we developed a methodology for assessing the level of attractiveness of the territory (based on the case method), which involves calculating a consolidated integral index based on six sub-indices presented in Table 1.

Table 1. Sub-indices of the attractiveness of the territory and their defining parameters

Name of the subindex	Indicators
1. Population characteristics as an indicator of life quality in the city	− average life expectancy, which shows the average number of years of a person's upcoming life; − migration growth, showing both population growth and decline; − number of deaths per 1,000 population; − number of births per 1,000 population; − population density is the number of inhabitants per 1 square kilometer of the territory, that is, the population density at a particular territory.
2. Economic components of the city's attractiveness	− average monthly nominal accrued salary, as this indicator is one of the most significant indicators in assessing the quality of life of the population; − number of available jobs and the level of registered unemployment, since the labor market, from our point of view, plays an important role in choosing a place of residence; − retail trade turnover, reflecting the totality of all funds received from the sale of goods to the public for personal consumption or use; − investment in fixed assets per capita shows the attractiveness of million-plus cities for investors; − number of enterprises and organizations operating in a certain territory; − ownership of passenger cars per thousand inhabitants.
3. Traffic situation in the city	− average score of traffic jams per day in the city.
2. Environmental component of the city's attractiveness	− air quality index (AQI), which can take values from 0 to 500, while the higher the value of this indicator, the higher the level of air pollution; − green areas, namely, garden and park complexes artificially created on a certain territory (parks, squares, boulevards, etc.); − average standard for the accumulation of municipal solid waste (MSW) per 1 person per year.
5. Infrastructural component of the city's attractiveness	− number of educational institutions (universities, institutes, academies, religious educational institutions, vocational schools, colleges); − number of schools; − number of kindergartens; − number of places in organizations that carry out educational activities for preschool education, supervision, and care of children; − number of Wi-Fi spots; − number of medical organizations (hospitals plus outpatient facilities); − number of cinemas; − number of pools;

	− number of fitness clubs; − number of shopping and entertainment centers; − number of water parks; − number of coworking spaces.
6. Affordability of amenities and benefits for the inhabitants of the city as a component of its attractiveness	− total area of residential premises per urban resident on average; − housing affordability; − affordability of rental housing; − affordability of utility fees; − affordability of medical services in private clinics; − affordability of private kindergarten services; − affordability of university education; − affordability of a public transport ticket for 1 month; − affordability of leisure facilities (average cost of a movie ticket, average cost of a theater ticket, average cost of monthly membership for a pool, average cost of monthly membership for a fitness club).

Direct communication and feedback indexing methods were used to bring the indicators included in these sub-indexes to a common form:

1) the direct communication method calculated by the formula (1):

$$\frac{Xi - Xmin}{Xmax - Xmin} \quad\quad (1)$$

2) the feedback method calculated by the formula (2):

$$\frac{Xmax - Xi}{Xmax - Xmin} \qu\quad (2)$$

For a more complete and qualitative analysis of the attractiveness of million-plus cities, an assessment of the regulatory framework in the field of strategic management was carried out, according to the results of which a consolidated (integral) index on management in the field of the attractiveness of cities was calculated.

3   RESULTS AND DISCUSSION

The final results of the integral attractiveness index for each million-plus city for 2019 are shown in Figure 1. The undisputed leader in terms of the attractiveness of the territory is Kazan, with a final value of 0.59.
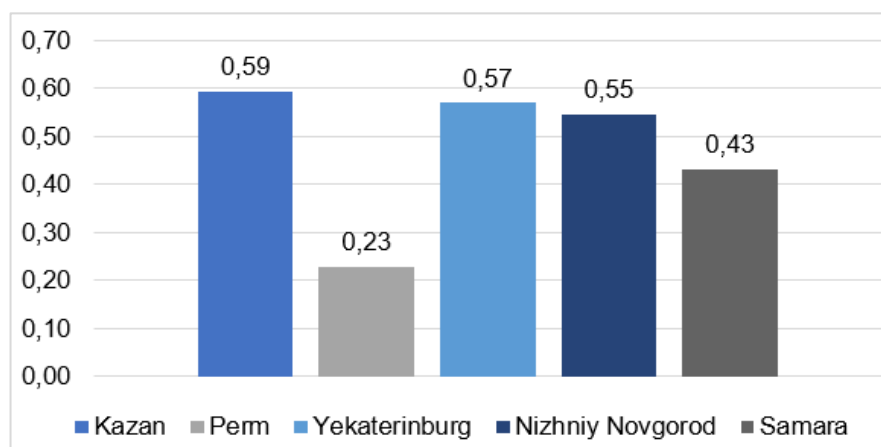
Figure 1. Integral index of the attractiveness of million-plus cities

Analyzing the situation in the context, according to the calculated sub-indices in this city, we can state the fact that the lowest indicator is observed in the "Comfort of living in the city" block (0.44), which is due to the presence of traffic jams in the city. In addition, Kazan has some environmental problems (Figure 2).
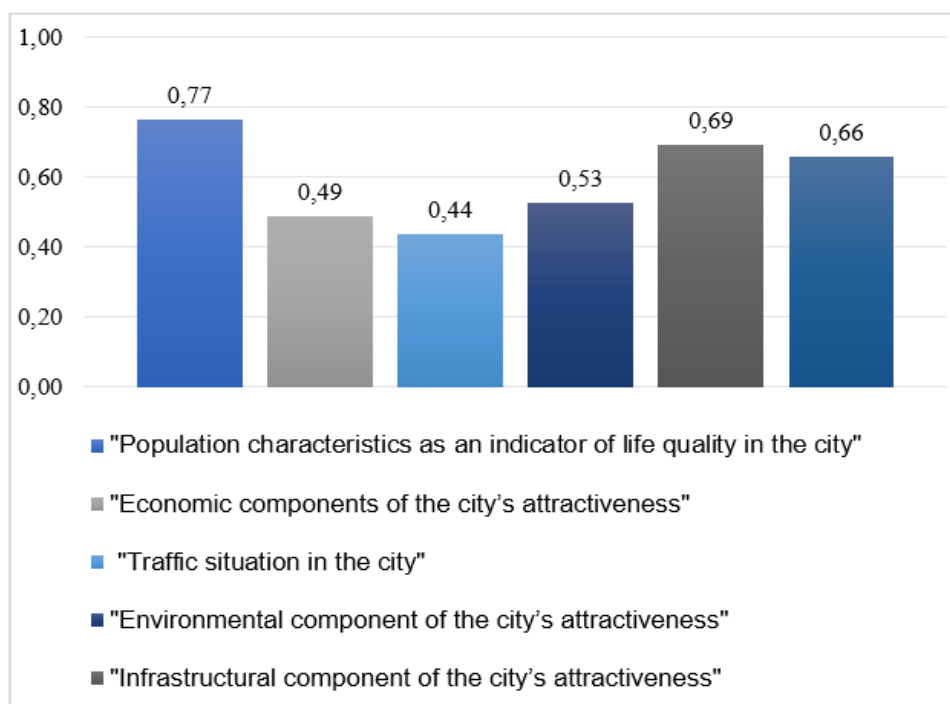

Figure 2. Sub-indices of the integral attractiveness index of Kazan

Yekaterinburg is slightly behind Kazan in terms of attractiveness index (0.57), followed by Nizhny Novgorod (0.55).

In Yekaterinburg, the most acute problem is related to the environmental situation (0.27) in 2019, and there is also a problem of traffic jams on the roads (Figure 3). In addition, there is a problem of unemployment in Yekaterinburg and the city also has one of the highest prices for utilities.
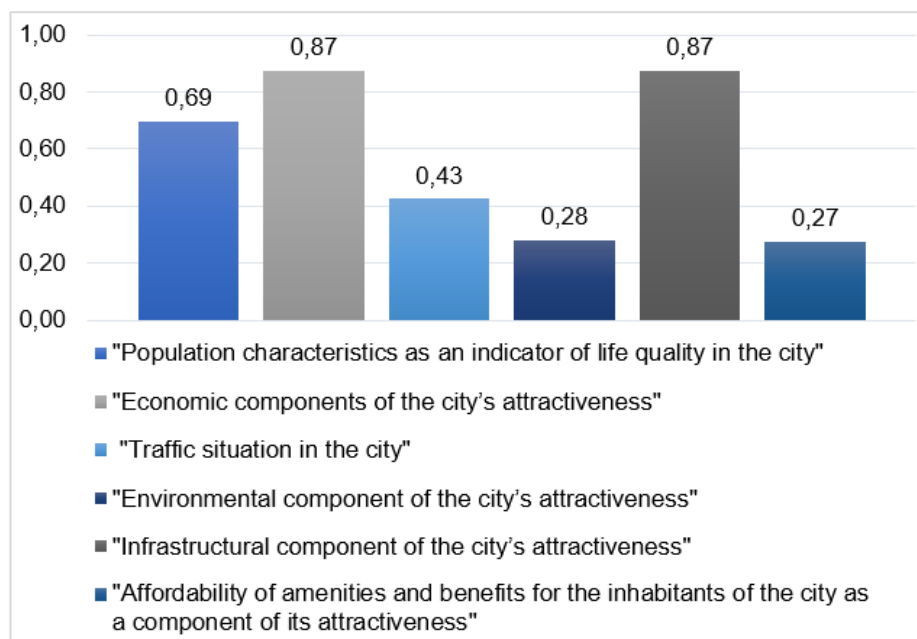
Figure 3. Sub-indices of the integral attractiveness index of Yekaterinburg

Nizhny Novgorod has a large number of deaths per 1,000 people and a low average
life expectancy compared to other analyzed cities. In addition, Nizhny Novgorod had a
relatively low retail turnover in 2019 and an insufficiently developed infrastructure
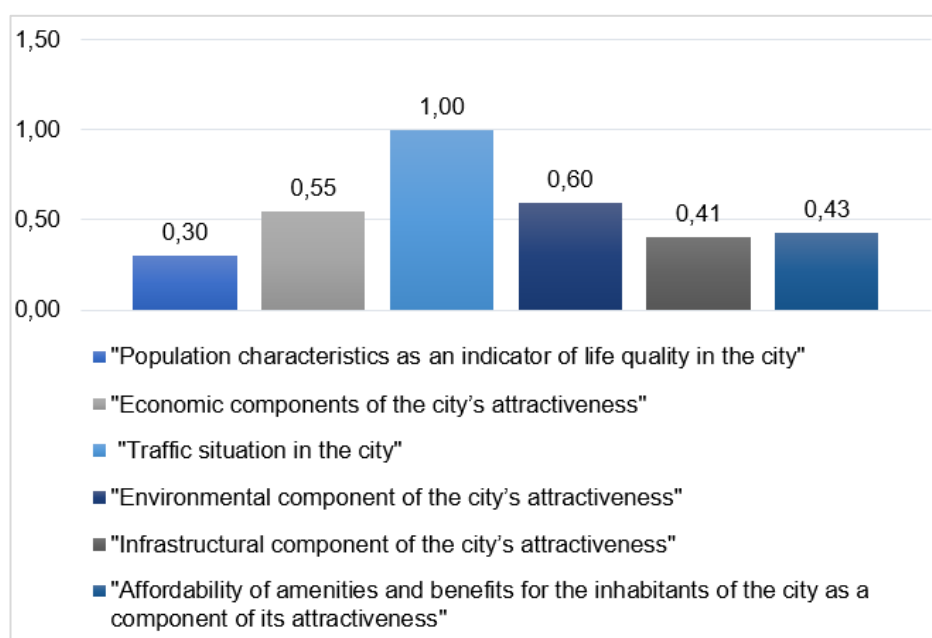(0.41) (Figure 4).

Figure 4. Subindexes of the integral attractiveness index of Nizhny Novgorod

For Samara, the composite attractiveness index was 0.43 (Figure 5). The problems
in this city are similar to the ones noted in Nizhny Novgorod, namely, there is a large
number of deaths per 1,000 people and a low average life expectancy. In the economic

sphere, one can note such problems as low retail turnover and a relatively small number of enterprises and organizations in comparison with other cities. The comfort of living in the city is reduced due to the presence of traffic jams, high utility prices, and an insufficient number of kindergartens.
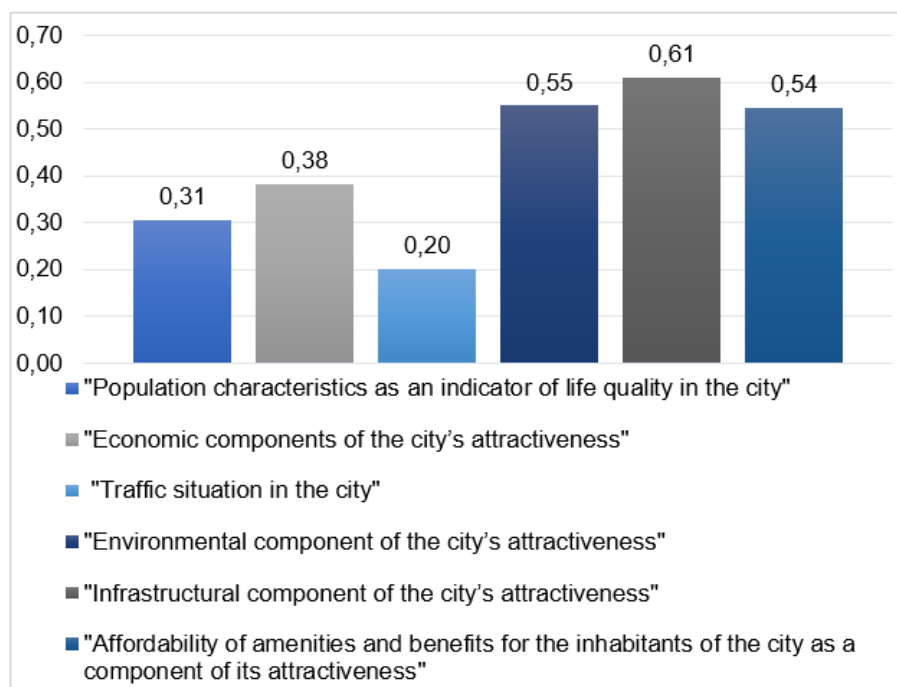

Figure 5. Sub-indices of the integral attractiveness index of Samara

The lowest level of attractiveness among the analyzed objects is in Perm, with a composite attractiveness index of only 0.23 (Figure 6).
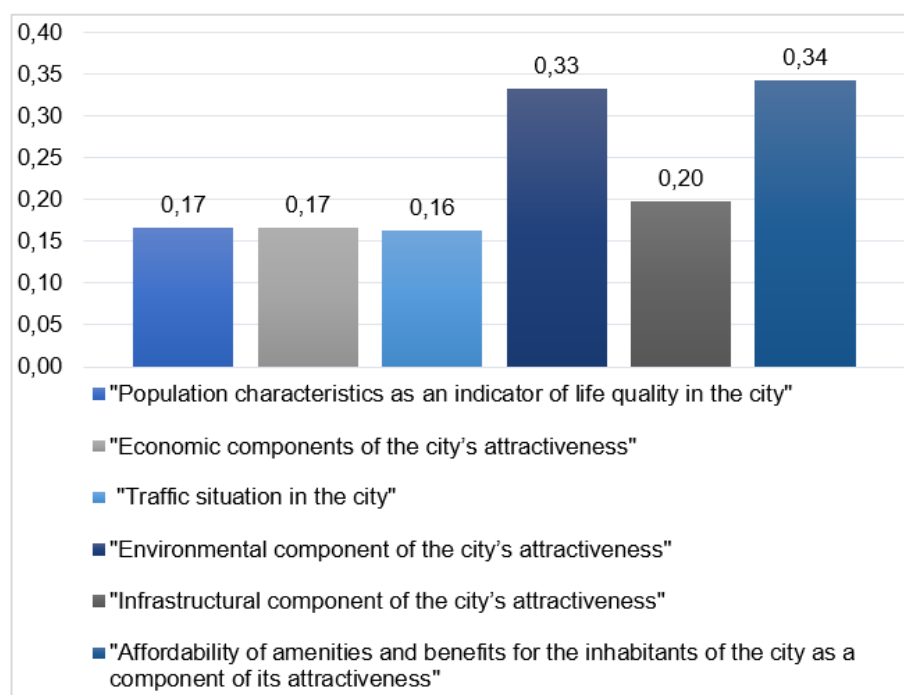

Figure 6. Sub-indices of the integral attractiveness index in Perm

Perm has a relatively low level in all indicators of sub-indices in comparison with other analyzed million-plus cities, which hints at the presence of a fairly wide range of problems that require immediate solutions.

Having analyzed the strategic regulatory documents of the analyzed cities, the following conclusions can be drawn. The largest number of municipal programs (24) has been noted in Nizhny Novgorod, and the smallest number (13) in Kazan, which is since not all municipal programs currently in force are indicated in regulatory legal acts (Table 2).

Table 2. Legal regulation of the attractiveness of the analyzed million-plus cities of the Russian Federation

	Presence of a city development strategy	Presence of a master plan	Number of municipal programs	The total amount of financing for municipal programs, thousand rubles
Kazan	1	1	13	25,419,480.83
Perm	1	1	19	165,785,362.18
Perm	1	1	23	272,714,359.85
Nizhniy Novgorod	1	1	24	195,577,589.085
Samara	1	1	15	37,329,326.43

Having calculated the integral index of the total amount of financing for municipal programs (Table 3), it can be concluded that the largest amount of funds allocated for the implementation of municipal programs have been noted in Yekaterinburg (1.00). The average values have been noted in such cities as Nizhny Novgorod (0.69) and Perm (0.57). In Samara, the indicator in question has reached 0.05. The smallest amount of municipal program financing has been observed in Kazan, where this index is equal to 0.00, while it should be borne in mind that some municipal programs in Kazan do not show information about financing.

Table 3. Indices of the legal regulation of the attractiveness of the analyzed million-plus cities of the Russian Federation

	Index of the presence of a city development strategy	Index of the presence of a master plan	Index of the number of municipal programs	Index of the total funding of municipal programs	Consolidated (Integral) management index
Kazan	1	1	0.00	0.00	0.50
Perm	1	1	0.55	0.57	0.78
Yekaterinburg	1	1	0.91	1.00	0.98
Nizhniy Novgorod	1	1	1.00	0.69	0.92
Samara	1	1	0.18	0.05	0.56

Having calculated the consolidated (integral) management index and the consolidated (integral) attractiveness index of the analyzed million-plus cities, we will present the data graphically (Figure 7).
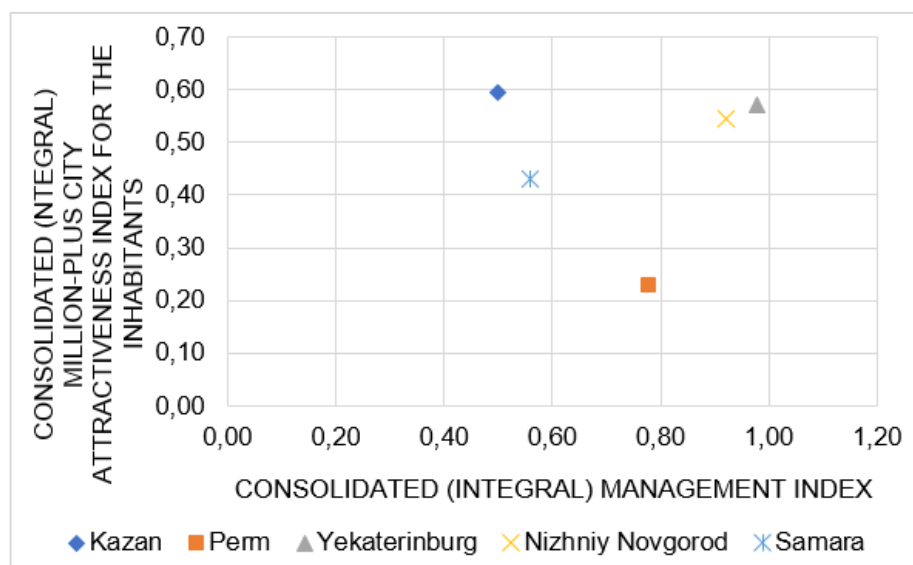
Figure 7. Consolidated (integral) attractiveness index and consolidated (integral) management index of the analyzed million-plus cities for 2019

Thus, based on the data obtained, it can be noted that Yekaterinburg and Nizhny Novgorod are approximately at the same level in terms of the indicators under consideration. Kazan has the highest composite index of attractiveness among other analyzed cities, but the lowest integral management index. As for Samara and Perm, things are worse in these cities than in other million-plus cities under consideration.

4   CONCLUSION

One can identify common problems for all million-plus cities. One of them is the difficult ecological situation in urbanized territories. To solve it, it is important to carry out several measures related to the expansion of green zones, the transfer of vehicles to environmentally friendly motor fuels to reduce emissions of pollutants into the atmosphere, and it is also important to involve citizens in joint activities to clean streets and maintain a clean environment in the city.

The second common problem in all cities is connected with heavy traffic. Based on the experience of European cities, it is possible to propose measures such as improving the quality of public transport, developing an efficient transport system, increasing fines for traffic violations, and increasing prices for parking spaces in the city center.

The problem associated with unemployment in Yekaterinburg and Nizhny Novgorod can be solved partly by creating additional jobs to improve the urban environment, as well as through the implementation of special municipal programs to improve the employees' skills or retrain them.

It is advisable to solve the problem of high utility prices in Yekaterinburg and Nizhny Novgorod by introducing innovative technologies for heating and the active use of thermal insulation and energy-saving installations.

To increase the turnover of retail trade in Nizhny Novgorod, Samara, and Perm, it can be proposed to monitor the state of the consumer market in these cities and develop preferential municipal rental or leasing programs for the necessary logistics facilities and other equipment to activate retail trade.

To increase the attractiveness of Nizhny Novgorod, Samara, and Perm, it is important to pay attention to their infrastructure. It is advisable to repair it, as well as ensure the construction of new shopping and entertainment centers and sports facilities in Nizhny Novgorod, educational institutions in Samara, and leisure and educational institutions in Perm.

To improve the legal framework for regulating the attractiveness of Kazan, it is necessary to finalize municipal programs, since some of the analyzed programs of this city do not specify the amount of funding.

Thus, the proposed recommendations will improve the comfort of living in million-plus cities and make them more attractive and competitive.

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