

# The alignment technique of inter-territorial differences in housing and municipal development of urban agglomeration

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**Abstract.** The article presents the stages of the alignment technique of inter-territorial differences in the housing and municipal development of the urban agglomeration. Approbation of the technique was implemented within the framework of private purposes (alignment of the population's security in housing and municipal services and alignment of the state system of the city economy) using the example of the Krasnoyarsk agglomeration.

## 1 Introduction

At the moment, the evolution of scientific views has led to the perception of urban agglomeration as a progressive and integral form of settlement, which concentrates a significant economic potential (Lappo and Lyubovnyi, 2011; Selivanova, 2007). As a result of the discussions, most scientists agreed that urban agglomeration is a compact and relatively developed set of complementary urban and rural settlements clustered around one or several huge cities and united by intensive multifaceted connections into a complex and dynamic unity; this is the space of potential and real interactions, which incorporates the weekly life cycle of the majority of inhabitants of a modern large city and its satellite zone (Kuznetsova, 2009). This type of settlement allows combining the benefits of concentration of various services in large cities with a dispersed nature of their realization and consumption, thus, maintaining a dynamic balance between the diverse economic, social and environmental conditions of people's life (McCann and Folta, 2011).

Sharp inter-territorial differences in the housing and municipal development of the urban agglomeration have as their inevitable consequence the expansion of the number of lagging territories, the weakening of the mechanisms of inter-territorial interaction and the growing contradictions, which makes it very difficult to implement a unified policy of housing and municipal transformation (Quigley and Rosenthal, 2005). It is proposed to use method to eliminate these negative consequences and to align inter-territorial differences in the housing and municipal development of the urban agglomeration allowing:

-choose indicators affecting on inter-territorial differences in the housing and municipal development on the basis of objects and purposes harmonization of

aligning inter-territorial differences in the housing and municipal development of urban agglomeration;

-comprehensively assess the variation and identify trends in housing and municipal development of municipalities with the help of a developed system of selected indicators and assessment methods that characterize the degree of inter-territorial differences; make management decisions about the need to reduce it;

-choose tools that require levels alignment of their housing and municipal development in the urban agglomeration depending on the capabilities and needs of municipalities;

-develop a set of measures aimed at aligning inter-territorial differences in the housing and municipal development of urban agglomeration using the selected tools.

## 2 Methods

The proposed technique for alignment inter-territorial differences in the housing and municipal development of the urban agglomeration consists of seven stages. The first stage of the technique is the harmonization of management objects and purposes for alignment of inter-territorial differences in the housing and municipal development of the urban agglomeration. Municipal and housing facilities are considered as objects of managing influence, i.e. the authorities' attention is directed on it to align of inter-territorial differences in the housing and municipal development of the agglomeration (Borovaya and Gubanova, 2008).

Since the alignment of inter-territorial differences in the housing and municipal development of the urban agglomeration is a multi-purpose system, it is necessary to clearly identify the purposes of alignment and distribute them on three levels (Klistorin, 2006): strategic, tactical and operational.

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**Table 1.** Indicator “Coefficient of housing and municipal service provision” before and after the measure.

Municipalities	2014	2015	2016	2017	2018	Measure implementation
<b>Coefficient of housing and municipal service provision, %</b>						
Krasnoyarsk	79.13	79.49	79.57	79.71	80.17	80.48
Divnogorsk	72.14	72.14	72.46	78.83	79.11	79.44
Sosnovoborsk	85.71	85.71	85.71	85.71	85.71	85.93
Emelyanovskiy district	30.90	34.66	25.96	25.73	25.97	27.11
Suhobuzimsky district	31.14	34.44	30.84	30.99	30.93	32.00
Berezovsky district	48.07	48.20	48.33	49.87	51.26	52.01
Mansky district	19.78	20.57	24.31	19.73	19.91	21.15
Integral indicator	52.41	53.60	52.46	52.94	53.30	54.02

A set of purposes of different levels should be represented by a tree of purposes. Advantages of the tree of purposes are that it allows building relationships between the purposes of different levels, to split large purposes into stages, to see a clear picture of the system of purposes. A tree of purposes connects long-term and short-term purposes, purposes from different areas of life. The use of this technique makes it possible to create a strategic picture for alignment of inter-territorial differences in the housing and municipal development of the urban agglomeration. The top level of the tree of purposes can be a mission or vision (Kuznetsova, 2009).

The structure of the purpose system should correspond to the structure of the control object, then each purpose is achieved by a certain element of this object (Khokhlova, 2008). In this case, the purpose-oriented measure of each element of the control object is increased. Perhaps it is necessary to change the structure of the control object to achieve the required matching.

In accordance with the principle of measurability, inherent in the purposes for alignment of inter-territorial differences in the housing and municipal development of the urban agglomeration, a need of for their transformation into specific tasks (Skufyina and Baranov, 2007). For the purposeful alignment of inter-territorial differences in the urban agglomeration and its orientation to specific final results, at the second stage of the proposed technique, particular indicators of the assessment of the level of inter-territorial differences in housing and municipal development of municipalities in the urban agglomeration are selected, thus an integral indicator is constructed. The particular indicators are transformed and aggregated to compare them with each other (Amirova, 2018). At the same time, the level of inter-territorial differences in the housing and municipal development of the urban agglomeration can be assessed in the third stage of the technique by comparing the achieved results using the proposed measurement methods: the range of variation, the average square deviation and the coefficient of variation (Kuzmich et al., 2017). This set of methods considers all factors, conditions and features of housing and municipal development of municipalities in the urban agglomeration.

The harmonization of objects and purposes, the choice of indicators for assessing the level of inter-territorial differences in the housing and municipal

development of municipalities in the urban agglomeration, as well as methods for measuring inter-territorial differences provide the possibility of managing results, creation the system of motivation, comparison and assessment of options for solutions and, finally, the forces concentration in priority directions of activity, the formation of conditions that ensure the required results, as well as the work organization of the management subjects to achieve the set purposes (Kalinnikova, 2009).

If on the fourth stage of the technique, as a result of the verification, the need to reduce inter-territorial differences in the housing and municipal development of the urban agglomeration does not occur, then the management object and purpose are refined, and then the level and measure of the degree of inter-territorial differences in the housing and municipal development of municipalities is assessed again.

In the fifth stage, the alignment direction is selected depending on the third stage of this technique. In what direction of housing and municipal development (housing provision, the cost of housing, provision of housing and municipal services, the provision quality of housing and municipal services, sanitary cleaning system), according to the assessment of inter-territorial differences in the urban agglomeration, “bottle necks” appear, so such “necks” need in development of measures for alignment, relying on existing alignment tools (Klevtsova et. al., 2018).

In accordance with the purposes for alignment of inter-territorial differences in housing and municipal development, in the sixth stage, alignment tools of the level of inter-territorial differences in the housing and municipal development of the urban agglomeration are chosen. At the seventh stage of the technique, practical measures for alignment of inter-territorial differences in the housing and municipal development of the urban agglomeration are taken with the help of selected tools.

### 3 Results

Let’s consider approbation of method within the framework of particular purposes (alignment of the provision of housing and municipal services and alignment of the state of city economy system) on the example of the Krasnoyarsk agglomeration. Construction and commissioning of an incineration plant is measure for aligning inter-territorial differences in the housing

**Table 2.** Indicator “The degree of recycling” before and after the measure.

Municipalities	2014	2015	2016	2017	2018	Measure implementation
<b>The degree of recycling, %</b>						
Krasnoyarsk	90.00	93.00	95.00	96.00	97.00	98.29
Divnogorsk	28.00	30.00	52.00	58.00	62.00	78.44
Sosnovoborsk	38.00	42.00	60.00	75.00	80.00	88.65
Emelyanovskiy district	87.00	88.00	90.00	92.00	93.00	96.03
Suhobuzimsky district	3.00	5.00	7.000	9.00	10.00	48.94
Berezovsky district	85.00	86.00	87.00	89.00	90.00	94.33
Mansky district	2.00	3.00	5.00	7.00	8.00	49.50
Integral indicator	47.57	49.57	56.57	60.86	62.86	79.17

and municipal development of urban agglomeration (Anikina and Kuzmich, 2010). The plant’s productivity is 360 thousand tons per year, that is, one thousand tons per day. The name “incineration plant” does not accurately and fully determine the importance of the enterprise; rather it is a small heat and power plant with alternative fuel. The enterprise produces about 10 MWh of electricity.

As a result of the measure implementation, two indicators will be changed, assessing assess the level of housing and municipal development of the Krasnoyarsk agglomeration: “Coefficient of housing and municipal service provision” (Table 1) and “The degree of recycling” (Table 2).

Thus, according to Table 1, the indicator “Coefficient of housing and municipal service provision” increased in relation to the values of this indicator in 2018 by 0.72%. According to Table 2, the indicator “The degree of recycling” increased in comparison with the value in 2018 by 16.31%. An increase in these indicators indicates a positive effect of the measure taken for the Krasnoyarsk agglomeration as a whole.

The implementation of projects on the construction of incineration plants using existing agglomeration effects and the orientation of housing and municipal development programs for the integrated use of economic potential and innovative development will generally improve the level of territories development, and thereby reduce the degree of inter-territorial differences in the housing and municipal development of the Krasnoyarsk agglomeration.

It should be noted, that such agglomeration economy, which appears as a result of interaction within the

framework of the construction and commissioning of the incineration plant, applies to all municipalities located in the Krasnoyarsk agglomeration. As a result, we note a decrease, in particular, in the indicator “The degree of recycling” an absolute and average deviations in the degree of inter-territorial differences by 39.64 and 15.81 units respectively, the degree of its volatility by 31.66%; also we note a decrease in the indicator “Coefficient of housing and municipal service provision” an absolute and average values of deviations in the degree of inter-territorial differences by 1.02 and 0.4 units respectively, the degree of its variability by 1.4% (Table 3).

#### 4 Conclusion

According to the obtained results (Table 3), the measure taken to align inter-territorial differences in the housing and municipal development of the Krasnoyarsk agglomeration proved to be effective, i.e. reduced their degree.

Such agglomeration economy, which appears as a result of interaction within the framework of the proposed measure, applies to all municipalities located in the Krasnoyarsk agglomeration within a radius of 30 km (Lavrovsky, 2009). Such economy is obtained due to economy of production scale and economy localization associated with the location of enterprises.

Having new assessments of inter-territorial differences in the housing and municipal development of the Krasnoyarsk agglomeration, the implementation of new measures can be planned by changing the choice of the alignment direction in the housing and municipal

**Table 3.** The degree of inter-territorial differences in the housing and municipal development of Krasnoyarsk agglomeration implementing measure.

Assessing indicators	The degree of inter-territorial differences before the measure			The degree of inter-territorial differences after the measure		
	The range of variation, <i>R</i> , units	The average square deviation, $\sigma$ , units	The coefficient of variation, $V_{\sigma}$ , %	The range of variation, <i>R</i> , units	The average square deviation, $\sigma$ , units	The coefficient of variation, $V_{\sigma}$ , %
Coefficient of housing and municipal service provision	65.80	26.20	49.16	64.78	25,80	47.76
The degree of recycling	89.00	35.68	56.76	49.36	19.87	25.10

development of the agglomeration.

Thus, developed technique for alignment of inter-territorial differences in housing and municipal development of Krasnoyarsk agglomeration has an iterative character and is intended for constant control over the degree of indicators characterizing inter-territorial differences in the housing and municipal development of agglomeration.

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