Integral methods of measuring the population life quality in local communities of the region

Konstantin V. Getmantsev[*], *Tatiana A.* Myasnikova, *Alexander V.* Rodin, and *Kristina V.* Silchenko

Kuban State University, 350040 Russia, Krasnodar Krai, Stavropolskaya Street, bld. 149, Krasnodar, Russia

Abstract. The presented article discusses the method of constructing an integral indicator of measuring the life quality. An important problem in assessing the life quality of the population is the complex nature of this concept, covering a variety of quantitative and qualitative characteristics. Currently, in the absence of the possibility of conducting scientific research on a wide range of indicators at once, selective methods are used using a small number of indicators for assessing the life quality of the population. The authors propose to use a three-stage procedure for constructing an integral indicator based on the calculation of primary indicators, the procedure for their normalization and the construction of the final integral indicator for assessing the life quality of the population. Such a technique opens up wide opportunities for further scientific regional research, since it allows conducting research in the context of local territories of the region, as well as on the entire region scale.

1 Introduction

Currently, the concept of life quality of the population is widely used in the world scientific literature, as well as in the public space.

For the first time the term "life quality" appeared in economics – it was formulated in the 60s by the economist J. Galbraith, later this definition was used by scientists "to numerically express the features of the socio-economic environment of people's lives" [1]. Nevertheless, today this concept has been significantly expanded.

Speaking about the life quality, as a rule, they talk about a kind of subjective guideline for each person's life [2], his subjective idea of his own well-being [3]. Therefore, there cannot be a convenient and satisfying formulation of this concept here.

Life quality is a complex characteristic describing the evaluation of the effectiveness of a certain combination of conditions that determine a person's life. In general, the concept of the life quality of the population is an abstract, immaterial, and exclusively subjective category [4].

Many people generally have their own unique idea of the life quality. For example, two people. One is quite successful, has a high income, but his idea of his life quality is extremely low, because his environment has better living conditions or access to benefits that our

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[*] Corresponding author: kot34@mail.ru

conditional person does not have. The second person is in a difficult life situation, he is in trouble, but his idea of his life quality is quite satisfactory, since he has more negative examples from his environment.

For someone, the life quality is associated with freedoms, opportunities for expression, self-realization as a person, and for someone, the life quality is more material, expressed in the availability of certain products or services.

The variety of characteristics and parameters used makes it very difficult to study and assess life quality. Existing methods of assessing the life quality focus on individual characteristics of this complex concept, trying to create conditions for a comparative analysis of people's lives in different countries, regions, and cities [5].

A promising solution here is the construction of integral indicators that are able to assess the life quality indicators of different nature and type in a complex [6]. The construction of such integral indicators for measuring the population life quality is a complex problem.

2 Methods

The problem of measuring the population life quality is dealt with by various sciences: economics, political science, sociology, philosophy, geography, demography. At the same time, each science has developed its own conceptual apparatus, a system of categories, as well as approaches to conducting quantitative and qualitative assessment of population life quality. Such diversity is based on the versatility of the population life quality concept and the need to consider its structural elements from different sides.

For the purposes of this study, economic methods based on the use of economic statistics were used, which allowed to identify the composition and describe the dynamics of private indicators of the population life quality, as well as the method of component-by-component analysis, which allowed to identify and explain the organization and structure of indicators of the population life quality.

The importance of using statistical methods is also dictated by the need to develop a methodology for studying the population life quality based on the use of stably collected static indicators, which allows for a retrospective analysis of the population life quality without conducting special studies. In addition, it is also important from the point of view of the practical use of the proposed approach in practice by public administration bodies.

The use of component-by-component analysis also opens up great prospects, since it makes it possible not only to reveal the internal structure of life quality indicators, but also to identify drivers in it that determine the dynamics of the development of the entire system of indicators of the population life quality.

To construct the resulting indicator, a method of integral assessment of the population life quality is proposed, based on the construction of a single summing assessment indicator. In this case, it is proposed to calculate the integral indicator of the population life quality in the context of individual territories of the region, which will allow assessing local differences in the indicators of the population life quality.

3 Results

One of the most important characteristics of the article proposed by the authors is the construction of a methodology for the integral assessment of the population life quality in local communities of the region. Shifting the focus in the study of the population life quality from the regional to the local level has a number of advantages.

First, it is at the local level that it becomes possible to explore not abstract values of the population life quality characteristic of the region or the whole country, but directly those

that determine the living conditions of specific people.

Second, the shift of emphasis in the study of the population life quality to the level of local communities makes it possible to differentiate the territories forming the region, to determine the most and least developed territories. This is important, for example, to explain the processes of internal migration of the population, intraregional movement of enterprises and businesses. Such information will help to form ideas about territorial differences in the living conditions of people and their economic activities.

Third, focusing on the problems of the development of individual territories makes it possible to raise the issue of revising measures of state regional support for such territories. Thus, successfully developing local communities are obviously less in need of regional assistance than the most problematic ones. Considering territorial differences in the development of indicators of population life quality makes it possible to differentiate state support measures – in particular, to develop a more optimal toolkit of support measures, as well as to ensure the necessary savings of budget resources.

At the same time, the problem of choosing a research methodology comes to the fore. The greatest prospects for the construction of estimated indicators of the population life quality today are integral indicators based on the calculation of a system of relative indicators that allow the assessment of local communities relative to each other, which gives the study a comparative character [7].

Integral evaluation indicators are characterized by considering a wide range of primary evaluation indicators to build a common resulting value reflecting a certain process. The population life quality is characterized by the use of a wide range of primary indicators, covering both subjective and objective assessment of the life quality. Such an approach is aimed at the widest possible reflection of various aspects of the economic and social life of people, united by the concept of "life quality" at the same time, such an approach presents a rather complex scientific problem, since the primary indicators of the population life quality used are of different quality. Their comparison is possible only with respect to similar indicators, which significantly narrows the potential for the study of the life quality of individual territories.

An equally important problem is the possibility of assessing the dynamics of the entire set of indicators at once. Such an assessment makes it possible to determine the emerging vector of social and economic development of the territory. Also, in the future, it is necessary to determine the leading factors that determine the dynamics of the socio-economic situation. It is impossible to do this by simply comparing individual indicators of life quality assessment, therefore it is necessary to use complex or integral assessment indicators and monitor them in dynamics. Integral indicators are also a more convenient solution because they allow for a comparative assessment of individual territories of the region. At the same time, combining different primary indicators for assessing the life quality, integral ones allow for a spatial assessment of the placement of individual factors and conditions that determine the life quality in the region. In contrast to a simple comparative assessment, the comparison of integral indicators allows not only to identify the centers of social and economic development of the region, but also to explain due to which local factors certain territories develop. Thus, integral indicators of measuring the life quality make it possible to conduct multi-level and multifaceted studies of the life quality in the region and in its local communities, opening up great opportunities for economic science.

In addition, when constructing integral indicators for assessing the life quality, mainly relative indicators should be used, i.e. indicators given to a certain general basis – for example, the population of the territory in respect of which the population life quality is being assessed. Unlike absolute indicators, relative ones allow to initially build generalizing characteristics, which is especially important when several primary indicators are used in the study that need to be compared. In addition, the use of relative indicators expands the

possibilities of the assessment itself, allowing it to be carried out in relation to various parameters chosen by researchers, to compare them with each other [8].

As the central issue of our research the justification of an integral methodology for calculating the population life quality can be considered. Such a technique should meet the following characteristics:

1) conducting an assessment of the population life quality in the context of local communities should allow conducting research both in individual communities and in the aggregate of all communities in the region,

2) the proposed assessment methodology should consider both individual assessment indicators and their totality, which makes it possible to form an integral characteristic of the life quality in each local community,

3) the necessary level of representativeness should be provided by a reliable official statistical base.

Accordingly, with these requirements, the authors have formed a system of estimated indicators of the population life quality - Figure 1.

The choice of this system of indicators is due to several reasons.

1)   these indicators comprehensively describe the state of the population life quality in the local communities of the region. The inclusion of several indicators is due to the need to reflect different aspects of such a complex phenomenon as population life quality,

2)   the selected indicators are present in the materials of official statistics, which is important when conducting comparative studies [9]. In addition, the use of official statistics makes it possible to conduct research in retrospect, which is important for determining possible trends in the development of indicators of the population life quality the in local communities [10].

3)   we tried to choose relative indicators as a basis. Since the assessment is supposed to compare local communities of different sizes, it was logical to bring them to a universal value, in particular to the number of residents in a particular community. In addition, we have selected several absolute indicators that are important for assessing the differentiation of the life quality between local communities in the region.

A separate requirement of such systems for assessing the population life quality is the possibility of constructing an integral assessment indicator. The integral indicator makes it possible to assess the state of the phenomenon under study as a whole and form an idea of the ongoing processes [11].

In our case, the problem is that all the indicators are of different quality and they need to be reduced to a single denominator, which makes it possible to build a single integral evaluation indicator on the basis of disparate indicators [12].
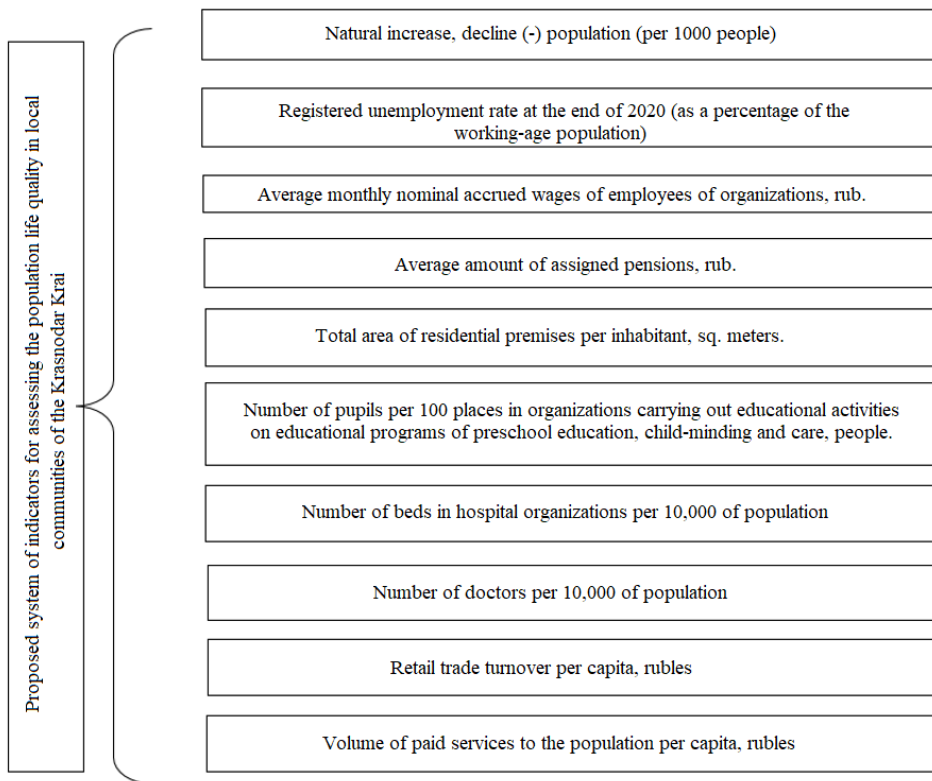
Fig. 1. System of indicators for assessing the population life quality in the region.

This procedure is called rationing. For the purposes of our study, the normalization procedure based on the construction of indices is best suited [13].

First, it is already used in the calculation of some indicators for assessing the life quality, for example, when calculating the Human Potential Index [14].

Second, the index formula of rationing does not require weighting coefficients or expert opinions, which allows calculations to be carried out without the involvement of experts [15].

To calculate the normalized indicators, the authors suggest using the usual index formula:

$$Normalized\ indicator = \frac{Current\ value - minimum\ value}{Maximum\ value - minimum} \quad (1)$$

Thus, by conducting a study in the context of local communities in the region, we will get a statistical idea of the place occupied by each territory between the "best" and the "worst" local community.

In this case, the best value will have the value 1, and the worst - 0. Accordingly, all values of local communities will be distributed in the range between 1 and 0 and will have the form of a decimal number. Further calculation of indices and the construction of an integral indicator of the life quality in local communities of the region can be carried out on the basis of the formula of average values.

An example of using the proposed methodology for calculating indicators of the population life quality in the context of local communities of the Krasnodar Krai according to the proposed methodology, performed by the authors, is shown in Figure 2.
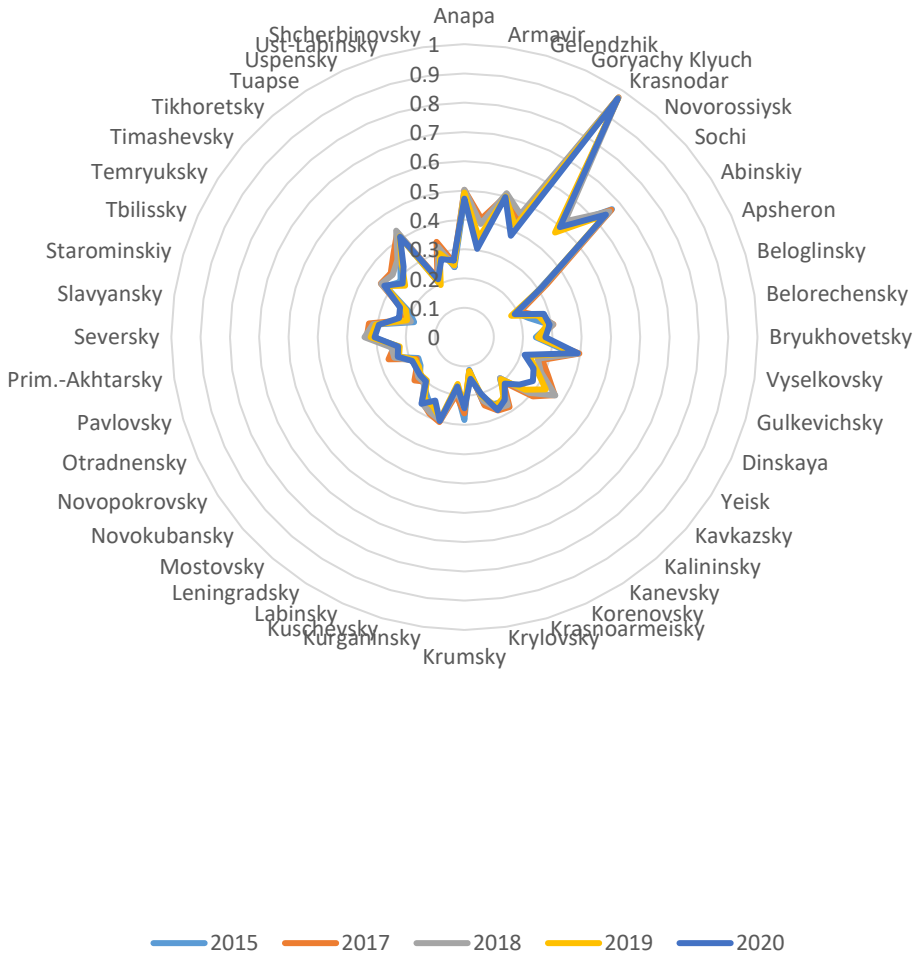
Fig. 2. Results of the integral assessment of the population life quality of the Krasnodar Krai in the context of local communities of the region (2015-2020) (compiled by the author).

In general, the results of the integrated assessment confirmed earlier conclusions about the leading position in terms of life quality in the region of large cities. This is primarily city of Krasnodar, which is almost 2.5 times higher in the values of the integral indicator of the assessment of the population life quality than other local communities. The resort city of Sochi also has high life quality indicators. The values here are lower than in Krasnodar, but they are also among the highest in the region.

Among other territories of the region, you can specify Vyselkovsky, Yeisk, Seversk, Temryuk, Tuapse district, as well as Anapa. Here, the indicators are insignificant, but higher

than rural areas, the "hinterland" of the region.

Among the least prosperous territories, Krylovsky, Uspensky, Novopokrovsky, and Starominsky districts can be distinguished. The standard and quality of life in them are the lowest in the region.

The dynamics of the development process of the integral indicator of the population life quality of the region is also of great importance. For example, the situation in Yeisk district and the city of Armavir is deteriorating from year to year. On the contrary, Krasnodar, Anapa, as well as Vyselkovsky and Tuapse districts are actively developing.

In general, the calculations carried out confirm the possibility of applying the approach proposed by the author to assessing the population life quality. In the future, they can be used by state authorities and local governments, for example, when creating a methodology for rapid assessment of the population life quality in the region.

4 Discussion

The article proposes the creation of a special evaluation tool for studying local communities in the region and carrying out the necessary differentiation of the state social and economic policy of the Krasnodar Krai.

The most important purpose of such a tool is the diagnosis and classification of local communities according to the level and nature of the life quality development [16].

First, it is necessary to identify groups of local communities independently and successfully solving issues of improving the population life quality. Such territories do not need state support measures from the region and the resources spent on them can be redirected to other territories [17].

Second, it is necessary to identify groups of local communities with relatively stable indicators of the population life quality and relatively in need of assistance from the region. Depending on the characteristics of the specific situation developing in these communities, regional support measures may differ significantly [18].

And, third, it is necessary to identify a group of local communities experiencing significant problems in population life quality development, turning into regional disaster areas, losing their residents due to the inability to create the necessary social conditions for them. Such territories need direct support from the region, multidirectional financing of their social facilities [19].

For such a classification of local communities in the region, for example, it is possible to use the indicator of the growth rate of the integral indicator of the population life quality, calculated by the method of principal components proposed by the author [20]. Then the results of the integral assessment of the population life quality of the Krasnodar Krai in the context of local communities of one region, which we performed earlier, take the following form – Figure 3.
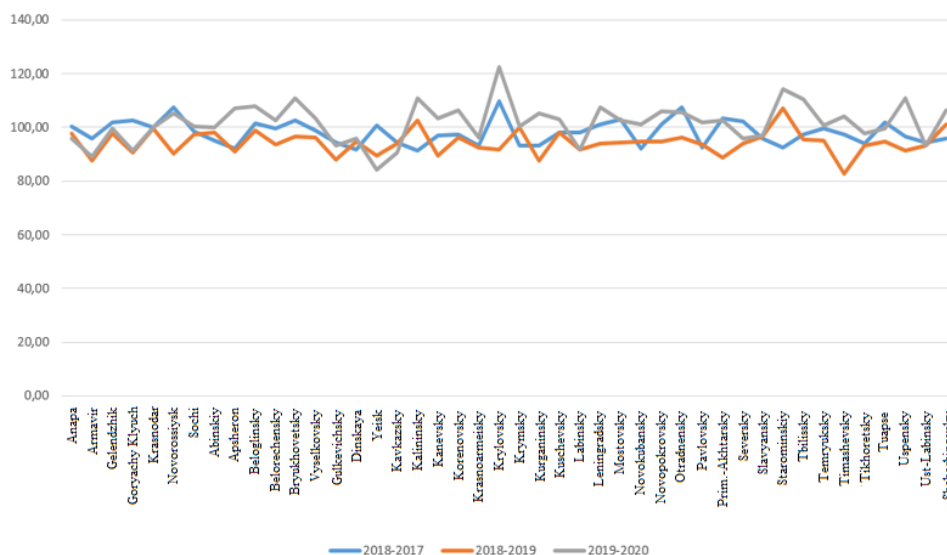
Fig. 3. Growth rates of the indicator of the integral assessment of the population life quality in local communities of the Krasnodar Krai.

Accordingly, the following classification of local communities of the Krasnodar Krai can be performed according to the development nature of indicators of the population life quality – Table 1.

Table 1. Classification of local communities of the Krasnodar Krai by the population life quality.

Community type	Community name	QLI indicators			
		Average value of the QLI growth rate	2018 to 2017	2019 to 2018	2020 to 2019
Successfully developing	Novorossiysk	100.95	107.48	90.35	105.04
	Beloglinsky	102.7	99.68	93.49	102.46
	Bryukhovetsky	103.3	102.66	96.48	110.67
	Kalininsky	101.6	91.32	102.42	110.99
	Krylovsky	107.9	109.62	91.76	122.46
	Leningradsky	100.9	101.23	93.97	107.50
	Novopokrovsky	100.7	100.97	94.63	106.10
	Otradnensky	103.1	107.47	96.17	105.65
	Tbilissky	101.1	97.26	95.45	110.44
	Shcherbinovsky	106.4	95.92	101.14	106.36
Stably prosperous	Anapa	98.1	100.38	97.89	95.92
	Gelendzhik	99.7	101.96	97.78	99.55
	Krasnodar	99.9	99.87	99.69	99.99
	Abinsk	97.7	95.21	98.05	99.93
	Apsheronsk	96.8	92.13	91.05	107.07
	Belorechensk	98.5	101.32	98.91	107.91
	Vyselki	99.5	98.97	96.24	103.44
	Kanevsky	99.6	97.03	89.44	103.47
	Korenovsk	99.9	97.25	96.38	106.22
	Krymsk	97.8	93.11	99.93	100.33
	Kurganinsk	95.3	93.32	87.43	105.10
	Kushchevsky	99.6	97.90	98.04	102.85
	Mostovsky	99.9	102.90	94.34	102.75
	Novokubansk	95.9	92.23	94.58	100.91

	Pavlovsky	95.9	92.42	93.42	101.95
	P.-Akhtarsk	98.2	103.40	88.61	102.72
	Seversky	97.3	102.29	93.86	95.74
	Slavyansk	96.4	95.66	96.76	96.83
	Tuapse	98.7	101.72	94.68	99.68
	Uspensky	95.6	96.69	91.19	110.82
Problematic	Armavir	90.8	95.77	87.71	88.97
	Goryachy Kluch	94.8	102.53	90.47	91.35
	Gulkevichi	91.1	94.51	88.03	93.27
	Dinskoy	93.9	91.61	94.59	95.66
	Yeisk	91.4	100.57	89.45	84.27
	Kavkazsky	92.9	94.27	94.10	90.41
	Krasnoarmeysky	94.1	93.35	92.62	96.10
	Labinsk	93.9	98.06	91.78	91.89
	Timashevsk	94.8	97.35	82.76	104.16
	Tikhoretsk	94.9	94.11	93.10	97.69
	Ust-Labinsk	93.6	94.52	93.17	93.09

As a result, all the territories of the region can be classified into three groups:

-    "successfully developing" local communities with high positive growth rates of the integral assessment of the population life quality,

-    "stably prosperous" local communities with both positive and negative growth rates of the integral assessment of the population life quality,

-    "problematic" local communities and disaster areas that have predominantly negative growth rates of the integral assessment of the population life quality.

It is important to note that in our study, when constructing an integral assessment of the population life quality, we used an index calculation formula, where we determined the position of a particular territory among the territories with the best (maximum) and worst (minimum) values. Thus, the study was conducted in relation to the development of all local communities in the region and, in particular, the economic centers and social service centers emerging in the region.

In the future, this approach can be used by public administration bodies in the development and implementation of policies in the field of regulating the life quality in the region [21].

The most important condition for such a policy should be the alignment and support of the population life quality in all local territories to prevent the emergence of serious regional imbalances [22]. This is important for many reasons. First, a certain average level of life quality should be formed in the region, characterizing this region regardless of the location of a particular territory in it. This is important for the formation of effective migration flows in the region based on economic decisions, and not forced migration from depressed territories to developing ones. Second, the state policy of supporting local communities should provide for the effective use of budgetary resources. This can be achieved only by ensuring the necessary differentiation of support measures. Third, the state policy of socio-economic development of the region should be able to monitor the dynamics of the situation in the field of population life quality to identify emerging negative trends and their timely changes.

5 Conclusion

The conducted study of the potential of using an integral approach to measuring the population life quality confirmed the prospects of using the proposed approach. This is explained by several points.

First, the very characteristic "population life quality" is integral, considering the various quality and composition of the assessment indicators. Life quality is a complex characteristic

that combines a wide range of indicators that characterize a person's income level,

Second, the quality of human life always has a pronounced territorial character. Thus, the specific conditions of work and social services of a person are formed in the immediate place of residence – the region or the local community. At the same time, it is necessary to distinguish regional characteristics of the population life quality and local ones. Thus, the region-wide characteristics reflect the average level of income and social services provided in the region, which is considered normal for it. On the contrary, the characteristics of local communities are more differentiated and reflect the peculiarities of people's lives in specific local territories of the region. At the same time, both indicators are interrelated – so the characteristics of the population life quality of local communities cannot be considered separately from the region-wide ones, since regional characteristics set a kind of life "standard" in the region.

Thirdly, differences in the population life quality of individual territories of the region lead to differentiation of local communities within the region, when some local communities are perceived by the population and business as relatively prosperous, and others as problematic territories. As a result, the population and entrepreneurs tend to move in the region in the direction of more prosperous local communities in terms of the level and quality of life. This in turn leads to the formation of large economic and social centers and disaster areas in the region.

Fourth, the study proposes a method for constructing an integral indicator for assessing the population life quality. The proposed method is based on the use of relative evaluation indicators subject to the rationing procedure to remove the effect of different-quality indicators on the evaluation results and the final construction of an integral indicator for measuring the population life quality in local communities of the region

Fifth, as a result of testing the proposed methodology, based on the calculations of the integral indicator of the population life quality in the local communities of the Krasnodar Krai, the grouping of local communities of the Krasnodar Krai into three conditional groups was carried out: "successfully developing", "stably prosperous", and "problematic" local communities. Each group corresponds to its own growth rates of the integral indicator for assessing the level and quality of population life.

Such a grouping of municipalities, together with the proposed methodology of integral measurement of the population life quality, can in the future be used by public authorities in differentiating measures to support local communities in the region, will ensure budget savings, and will increase the overall effectiveness of regional socio-economic policy.

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