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## MODEL OF RATING ASSESSMENT OF REGIONAL SOCIAL DEVELOPMENT

*The concept of rating administration of social development is considered and its characteristic features are highlighted. The model of rating assessment of regional social development is constructed. The developed model for rating assessment of social development of regions has been applied for a certain period; a graphical analysis and a description of the calculation results are made; the results are summed up and directions of implementation of the conducted research are determined.*

*Key words: social development, rating assessment, mathematical model, rating scale, public administration.*

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## МОДЕЛЬ РЕЙТИНГОВОЇ ОЦІНКИ РЕГІОНАЛЬНОГО СОЦІАЛЬНОГО РОЗВИТКУ

*У статті запропонована модель рейтингової оцінки регіонального соціального розвитку та її практична апробація.*

*Зазначено, що оцінювання соціального розвитку регіонів забезпечить ідентифікацію соціальних проблем та, відповідно, слугуватиме інформаційною базою для своєчасного коригування політики. Модель оцінювання не постійна величина: динаміка структури суспільства обумовлює зміну цілей управління і, відповідно, критеріїв його ефективності. Демократизація суспільства, реформування політичної сфери, ринкові перетворення та процеси європейської інтеграції суттєво змінюють наші уявлення про цілі, критерії та механізми функціонування соціальної сфери, відповідно повинна формуватися і оновлена соціальна політика.*

*Запропоновано об'єднати первинні показники людського розвитку в чотири основні блоки, за якими в подальшому і буде розраховуватись індекс: матеріальний добробут; демографічний розвиток; рівень освіти; розвиток ринку праці.*

*Визначено, що демографічний розвиток регіону інтегрує результати минулих та сучасних соціально-демографічних процесів через індикатори народжуваності, смертності та міграції. Характеристику розвитку регіонального ринку праці доцільно відслідковувати за допомогою показників економічної активності та ступеню її реалізації, умов та режимів зайнятості. Базою характеристики матеріального добробуту населення повинні стати показники рівнів та структури доходів і витрат, майнового розшарування та бідності, купівельної спроможності доходів. З метою виміру освітнього потенціалу доцільно використовувати такі показники, як середня тривалість навчання та питома вага осіб з вищою освітою серед населення.*

*Узагальнено, що за змістом і методикою розрахунку оцінювання відповідати міжнародним стандартам, враховувати специфіку України в межах чинного правового поля та проводитись на регулярній основі.*

*Продемонстровано практичну апробацію моделі рейтингової оцінки регіонального соціального розвитку.*

*Проведено ранжування регіонів України впродовж 2007-2016 рр. щодо ефективності управління регіональним соціальним розвитком. Виявлено завдяки проведеному ранжуванню регіонів щодо стану регіонального соціального розвитку виявило, що на першому та другому місці знаходиться м. Київ і Київська область відповідно. В столиці прослідковується висока оцінка ефективності управління регіональним соціальним розвитком і вона утримує першість з усіх діагностованих аспектів. Наступні місця належать Харківській та Львівській області. Однак їх домінування не є таким виразним. На протилежному боці шкали розмістились Кіровоградська, Закарпатська та Рівненська області.*

*Доведено, що використання методики оцінювання ефективності управління регіональним соціальним розвитком забезпечує як обґрунтованість порівнянь ефективності управління регіональним соціальним розвитком окремих регіонів країни, так і динаміку протягом певного періоду для окремого регіону; дозволяє виконувати методологічно коректні зіставлення як за інтегральним індексом, так і за його складовими – індексами окремих аспектів розвитку; сприяє визначенню найбільш сильних й проблемних регіонів.*

*Ключові слова: оцінювання, соціальний розвиток, ефективність управління, управління регіональним соціальним розвитком, показники, рейтинг.*

**Introduction.** In order to make effective administrative decisions on the development and introduction of necessary mechanisms of implementing the strategy of social development of the region, the assessment of correspondence of the whole set of conditions, factors, mechanisms and trends of the region's functioning to certain principles and priorities is of paramount importance. This assessment can be obtained due to a hierarchically constructed system of development indicators that characterize its components on the basis of objective system knowledge of composition, mechanisms of functioning of the region's development in accordance with their place and role in social development.

Due to the complexity of simultaneous control of a large number of various indicators in the process of analyzing the development of social systems, methods of integrated assessment which can be used to calculate rating as a generalized assessment of regional development have become widely used [1-6].

A number of methods have currently been developed and applied for rating assessment of activities of individual financial, economic, educational and economic institutions. At the same time rating administration, in spite of the active use of various types of integrated assessments, is scarcely developed in regional public administration and analysis.

**Literature review.** Issues of rating administration in general and social development in particular have been investigated by Blahun I., Dmytryshyn L., Bogatov O., Lysenko Yu., Petrenko V., Skobelev V., Bodnaruk I., Buhai S., Kulyk A. and others. They paid attention to the specification of the definition, the characteristics of its components, the peculiarities of the use of special technologies of development and making of administrative decisions by public authorities [1–5].

However, by this time the use of rating has not led to a significant transformation of procedures of making decisions by users of rating assessment, which is because of the separation of existing rating assessment techniques from the real administrators' decision-making scheme.

**The aim of the article** is to study the theoretical foundations of rating administration of social development of the region and to work out a model of rating assessment of regional social development, the application of which will ensure the validity of comparisons of the effectiveness of public administration of regional social development of individual regions as well as the dynamics for a particular region during the investigated period and will make it possible to identify the most successful and problematic regions, will contribute to the implementation of a methodologically correct comparison according to the integral index and its components.

To achieve the aim there was set a number of tasks:

- to consider and substantiate the theoretical foundations of rating administration of the region's social development;

- to develop a model of rating assessment of regional social development, the application of which will make it possible to carry out an effective analysis and to make adequate administrative decisions by public authorities and other stakeholders;

- relying on the formed information base of indicators of regions' social development and the engineered author software for the automation of activities concerning the diagnosis of social development of regions to carry out a testing of the developed theoretical and methodological materials;

- to reason the expediency of using rating assessment of social development for the improvement of social administration.

**Results.** According to the research of sources [1–6], the essence of rating as a generalized assessment is to evaluate the position of the analyzed object on the selected scale; at the same time the place of the region on the graduated scale serves as the starting point not only for analyzing the adequacy of the movement of the region separately, but also for comparing the achieved levels of all regions.

The rating approach to the administration of social development of the region involves the development, modeling, adoption and correction of managerial decisions by public authorities on the basis of comprehensive and profound information processing, which involves the use of an extensive system of social indicators that in the complex reflect objective social and economic processes and subjective well-being of the population [7]. According to the content and calculation methodology, rating assessment of social development as a component of rating administration must comply with international standards, take into account the specifics of Ukraine within the current legal field and be conducted on a regular basis.

The necessity of using rating administration of social development of the region objectively follows from the complexity, multi-leveledness and diversity of the structure of the given socioeconomic system.

Thus, rating administration of social development of the region should be understood as a technology of developing and making managerial decisions in the social sphere, based on economic and mathematical modeling as well as on information and analytical technologies for obtaining and interpreting rating assessment in accordance with the purpose and objectives of administration [7]. An essential characteristic of the rating administration process is that rating assessment simultaneously functions both as a tool and as an objective of administration.

The purpose of rating administration of social development of the region is to detect, prevent and neutralize various kinds of social regional disproportions, problem situations, critical phenomena and processes; to ensure effective formation and use of regional potential for the aim of stable, balanced and proportional social development of regions.

Given the multi-leveledness of the regional social system, two main levels of rating administration – internal and external – should be considered. Internal rating administration is carried out by the subject of administration – self-administration, the main objectives of which are to ensure the effective use of the region's potential, stability, balance and proportionality of the development of various objects, phenomena and processes; to detect, prevent and neutralize various kinds of disproportions, problem situations, critical phenomena and processes. External rating administration is carried out by subjects of higher levels of administration. Its main objectives are to use the potential of regions effectively and to form a single regional space.

In terms of complexity input information for rating assessment of social development of the region can be one-dimensional and multidimensional. Obtaining of one-dimensional information is carried out by ranking objects or features according to one indicator (dimension) or index. Obtaining of rating information in a multidimensional version is carried out by constructing a full integral assessment. For studying, analyzing, modeling of social development of the region, multidimensional information is basic, whereas one-dimensional information can be used in interpreting or detailing the before-mentioned one.

Rating assessment in rating administration of social development of the region is a necessary element of fulfilling all functions of public administration. It can be used at all stages of administration cycle to realize their

various stages, since it is both a tool and a purpose of administration. As follows from its content, it is information and analytical and integrates the functions of diagnostics, the search for optimal ways of the system's development, as well as control of its quality status and administration efficiency. In this form rating assessment of the region's social development should be considered as an integral indicator summarizing, integrating and compactly representing the information contained in the aggregate of primary indicators, providing a more qualitative definition of the process of system integrated assessment of the regional social situation.

Taking into consideration the complexity, value, versatility and diversity of rating assessment (rating), rating administration will become truly efficient and effective only when rating is not only actively used for decision-making, but also when there is provided the organic integration of the process of its receipt and interpretation with the goals of functioning and development of the region and administration of it, and accordingly of the stages, functions and procedures of making administrative decisions.

The process of rating calculation is an assessment of data set for the comprehensive measurement of the results of the social system's activity by means of fixed scales in accordance with the methodology that is determined in relation to the purpose of assessment. It is possible to distinguish five main stages: preparation of primary data; processing of data; statistical analysis; trend analysis; rating calculation.

The basis for determining rating assessment of a socioeconomic system is the primary information about the system's functioning. A universal set of indicators, that is, a set of all indicators needed to determine rating, is formed through a combination of all relevant data contained in the array of standard and specific information, as well as bringing them to a single format.

The purpose of primary data processing is choosing an initial set of indicators. The result of the data processing algorithm is a set of intermediate indicators. The latter may be average values, coefficients, and consolidated indicators. To evaluate the set of intermediate indicators, a comparative analysis is carried out with a similar in structure set of intermediate indicators of the reference socioeconomic system (or with norms).

According to the chosen algorithm integral assessment is carried out, herewith any chosen methodology is a computational procedure (algorithm) and contains a system of valuation indicators that characterize the activity of the socioeconomic system.

To ensure the transparency of rating administration of social development of the region, a universal set of primary indicators is structured in accordance with the objective composition of aspects and features of the socioeconomic system in sets of qualitatively homogeneous phenomena and processes, i.e. factorization is carried out.

In each specific case, depending on the subjects of administration for which rating assessment of social development and administration goals is determined, from the universal system an input system of indicators is allocated which most fully and relevantly characterizes the state of the socioeconomic system in terms of its next assessment.

The input system of indicators is critically evaluated – its completeness, quality and reliability are determined in accordance with the purpose of the study, minimizing of inaccuracies.

Thus, rating administration increases the reliability of the process of developing and making of administrative decisions in administrating complex multi-level socio-economic systems, as well as its effectiveness, providing an opportunity to evaluate various strategies for the development of the system.

Adoption of adequate effective administrative decisions by public authorities concerning the formation and implementation of regional social policy should be based on rating assessment of social development of regions, which quantitatively and qualitatively characterizes its components on the basis of objective system knowledge of the composition, structure, factors, mechanisms of functioning, development of the region according to their place and role in social development.

A prerequisite for valid results of diagnostic findings is the reliability of indicators that will detail the administration results in the sphere of social policy.

The selection of the system of representative indicators of social development is conditioned by a number of factors:

- availability of regional information base;
- possibility or impossibility of quantifying the results of certain directions of public administration in the sphere of social policy;
- analysis of indicators for human development characteristics proposed by scientists [8, 9].

Therefore the systematic analysis of the problem of diagnostic indicators selection let synthesize their hierarchical structure in which each indicator has an independent value and at the same time is an integral part of the generalizing index of demographic development or material well-being, education level or labour market development.

The model of rating assessment of social development of the region (1) is received by means of the aggregate indicator which is formed by a plurality of partial parameters obtained by the calculation of the corresponding submodels.

$$I_t = \sum_{i=1}^4 \alpha_i f_i(X_i), \quad \sum_{i=1}^n \alpha_i = 1, \quad \alpha_i \neq 0, \quad (1)$$

where  $I_t$  stands for rating assessment of regional social development at the moment of time  $t$ ;

$\alpha_i$  – the weight of the  $i$ -th component in the calculation of rating assessment of regional social development at the moment of time  $t$ ;

$f_i(X_i)$  – assessment of the  $i$ -th component of rating assessment of regional social development at the moment of time  $t$ .

The result of the calculation of each submodel involves the determination of the specific gravities of significance. These gravities are for material well-being, demographic development, education, and the labour market, respectively 0,4; 0,3; 0,2; 0,1; they are determined on the basis of generalization [8, 9] and the results of expert evaluation [7]. The structural scheme of the calculation of rating assessment of the region’s social development is given in table 1.

Table 1

**The structural scheme of the calculation of rating assessment of the region’s social development**

Criteria (factors), indicators		Formula
Demographic development	Demographic development index $D$ :	$D = \frac{1}{4} \sum_{i=1}^n X_i$
	average life expectancy at birth without gender differentiation (years)	$X_i = \frac{x_i - x_{i\min}}{x_{i\max} - x_{i\min}}$
	infant mortality rate, that is, children under the age of 1 (‰).	$X_i = \frac{x_{i\max} - x_i}{x_{i\max} - x_{i\min}}$
	migration balance (thousand people)	$X_i = \frac{x_{i\max} - x_i}{x_{i\max} - x_{i\min}}$
	Coefficient of migration intensity (‰),	$X_i = \frac{x_{i\max} - x_i}{x_{i\max} - x_{i\min}}$
Material well-being	Material well-being index $M$ :	$M = \frac{1}{4} \sum_{i=1}^n X_i$
	average monthly salary (UAH)	$X_i = \frac{x_i - x_{i\min}}{x_{i\max} - x_{i\min}}$
	monthly average pension (UAH)	$X_i = \frac{x_i - x_{i\min}}{x_{i\max} - x_{i\min}}$
	population with per capita gross income per month lower than the subsistence minimum	$X_i = \frac{x_{i\max} - x_i}{x_{i\max} - x_{i\min}}$
	decile coefficient of differentiation of total incomes of the population (times)	$X_i = \frac{x_{i\max} - x_i}{x_{i\max} - x_{i\min}}$
Education level	Education level index $O$	$O = \frac{1}{4} \sum_{i=1}^n X_i$
	coverage of children by preschool establishments ( % )	$X_i = \frac{x_i - x_{i\min}}{x_{i\max} - x_{i\min}}$
	coverage of children and adolescents by basic secondary education ( % )	$X_i = \frac{x_i - x_{i\min}}{x_{i\max} - x_{i\min}}$
	number of students of higher educational establishments of 1-2 accreditation level per 1000 people of the corresponding age (‰)	$X_i = \frac{x_i - x_{i\min}}{x_{i\max} - x_{i\min}}$
	number of students of higher educational establishments of 3-4 accreditation level per 1000 people of the corresponding age (‰)	$X_i = \frac{x_i - x_{i\min}}{x_{i\max} - x_{i\min}}$
Labour market development	Labour market development index $R$ :	$R = \frac{1}{5} \sum_{i=1}^n X_i$
	level of economic activity of urban population ( % )	$X_i = \frac{x_i - x_{i\min}}{x_{i\max} - x_{i\min}}$
	employment level of urban population ( % )	$X_i = \frac{x_i - x_{i\min}}{x_{i\max} - x_{i\min}}$
	unemployment level of urban population according to the methodology of the International Labour Organization (ILO) ( % )	$X_i = \frac{x_{i\max} - x_i}{x_{i\max} - x_{i\min}}$
	correlation of the levels of registered unemployment and the one determined according to the ILO’s methodology (coefficient)	$X_i = \frac{x_{i\max} - x_i}{x_{i\max} - x_{i\min}}$
	correlation of average monthly salary with the statutory minimum subsistence level for able-bodied persons ( % )	$X_i = \frac{x_i - x_{i\min}}{x_{i\max} - x_{i\min}}$
Rating assessment of the region’s social development		$I = 0,4 \cdot D + 0,3 \cdot M + 0,2 \cdot O + 0,1R$

The value  $I_t$  has the unit variation – (0; 1). The best assessment value for that period is when the index  $I_t$  is close to “1” and the worst – when it is close to “0”. The proposed model is open for making logical changes and additions.

Distribution of groups of regions into clusters using rating values according to the point system will allow us to identify 5 clusters in which the social situation has close and similar indicators: A – optimistic [1; 0.6]; B – dynamic [0.5; 0.6]; C – average [0.4; 0.5]; D – stagnant [0.3; 0.4]; E – crisis [0; 0.3].

In each particular case, depending on the subjects of public administration for which rating assessment of social development is determined, and on the objectives of administration, from the universal system an input system of indicators is allocated that most fully and actually characterizes the state of the socioeconomic system in terms of its next assessment. The input system of indicators is critically evaluated – its completeness, quality and reliability are determined in accordance with the purpose of the study, minimizing of inaccuracies.

Rating assessment of social development of Ukraine's regions according to the model (1) was carried out during 2007–2016 according to the State Statistics Service of Ukraine.

The results of modeling of social development of Ukraine's regions during 2007–2016 are shown in figure 1.

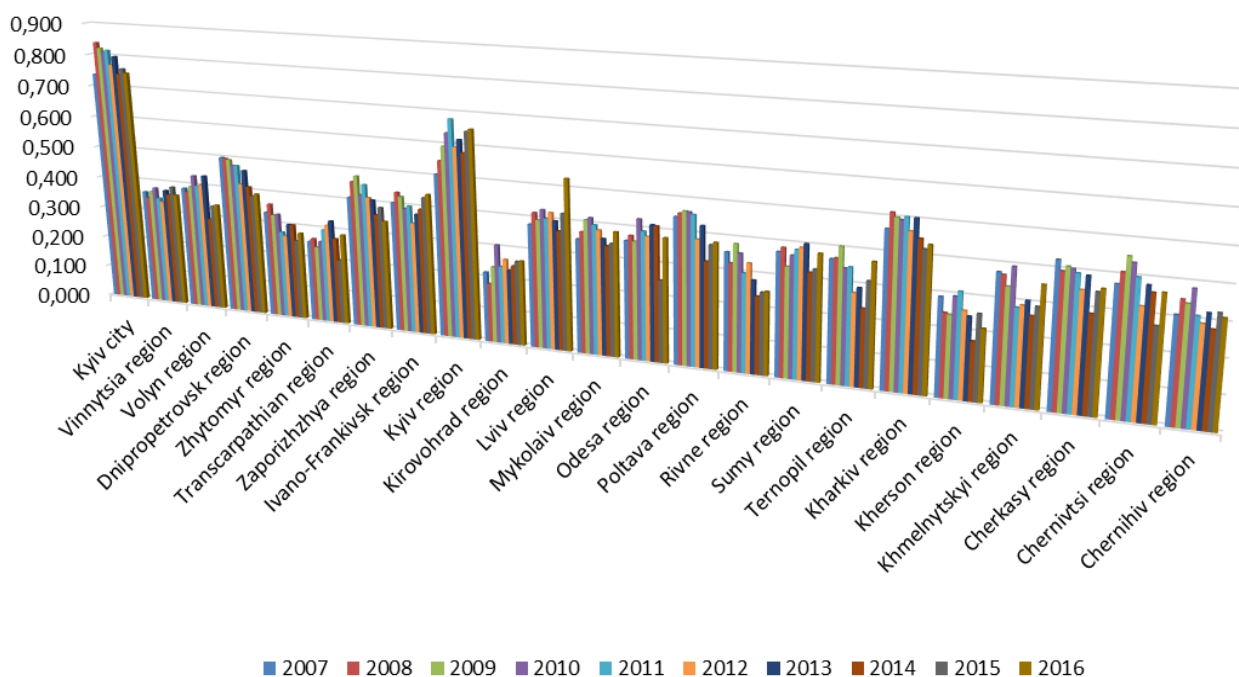


Figure 1. The results of modeling of social development of Ukraine's regions

The conducted ranking of the regions according to their social development revealed that Kyiv and Kyiv region, respectively, are in the first and second place. In the capital an optimistic outlook for social development is observed, and it holds primacy from all diagnosed aspects of social development. The following places are taken by Kharkiv and Lviv regions. On the opposite side of the scale there are Kirovohrad, Transcarpathian and Rivne regions.

According to the index of demographic development the first place belongs to Kyiv which is characterized by the best indicators of average life duration at birth and migration movement. The following places belong to Ternopil and Lviv regions, the reasons for this, first of all, are high rates of average life expectancy. The last positions on the ranked scale take Dnipropetrovsk, Zhytomyr and Transcarpathian regions.

According to the state of material well-being of Ukraine's population, Kyiv is leading, which is explained by considerably higher salaries than in the regions and, accordingly, rather high pensions. The difference in the amount of pensions in Kyiv and other regions is not so significant due to the existing limitations on the maximum amount of pensions. The capital also ranks first according to the level of unregistered incomes. The worst financial situation of the population is observed in Rivne, Kherson, Kirovohrad and Zhytomyr regions, which shared the crisis positions in the rating of the generalizing index of material well-being of population among the regions of Ukraine.

According to the index of education level, Kyiv and Dnipropetrovsk regions are progressively developing. In Lviv region there is observed the highest number of students of institutions of higher education of 1–2 accreditation levels per 1000 people of the corresponding age (%) from 2007 to 2016. The last positions according to the education development are taken by the following regions: Ivano-Frankivsk, Rivne, Ternopil, Transcarpathian and Chernihiv. The lag of these regions is because of various reasons: if Ivano-Frankivsk, Ternopil and

Transcarpathian regions fall behind because of low rates of coverage of children by preschool education, then Rivne and Chernihiv regions are outsiders due to all consistently low rates of the population's educational level.

The ranking of Ukraine's regions according to the index of labour market development suggests that labour markets are not developed in Rivne, Ternopil, Chernivtsi and Chernihiv regions.

Rating assessment calculated during the diagnosis is a simplified reflection of reality. However, on its basis, there can be constructed both a single scale, in which, in a ranked order, all regions of Ukraine are placed, and a scale for a certain period for a separate region.

The final result of the methodology application should be the development and monitoring of the implementation of targeted programs and specific targeted measures aimed at overcoming negative phenomena and ensuring the further development of human potential in the selected regions.

**Conclusion.** Thus, as follows from the research, the possibility of considering rating administration of social development of the region as a technology for developing and making of administrative decisions based on mathematical modeling and the latest information technologies for obtaining, interpreting of rating assessment is substantiated. Further implementation of rating assessment will increase the reliability of the process of developing and making of administrative decisions in regional public administration, providing a possibility to evaluate various strategies for the socioeconomic system's development.

Consequently, the use of the developed and tested model of rating assessment of regional social development provides the validity of comparisons of the effectiveness of public administration of regional social development of separate regions as well as the dynamics during the investigated period for a particular region.

There is highlighted the possibility of identifying the most successful and problematic regions, as well as the implementation of methodologically correct comparison according to the integral index or its components – the indices of material well-being, demographic development, education level, labour market development.

The comparative evaluation demonstrated that the proposed methodology of rating assessment of social development of the region allows: to carry out a systematic analysis of the problem, its structuring and presentation in the form of a hierarchy; to form a database of the actual state of regions through the calculation of both the integral index and its structural components; to provide dynamic comparability of assessments, taking into account indicators-stimulators and indicators-disincentives of social development; to work with a variety of statistical information; along with a wide range of quantitative characteristics of social development of regions to take into account the qualitative aspects of the problem that do not have a direct numerical expression.

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