Estimation of the Effectiveness of Investment Strategies by Calculating the Integral Index

E. A. Dolbnya, N. S. Oshchepkova, Y. Y. Savina
Kemerovo State University, Kemerovo, Russia
Oshchepkova_n@list.ru

Abstract— **The article is devoted to the problem of choice of method of efficiency estimation of the region's investment strategy. The aim of this study is to improve the current method of assessing the region's investment strategy by identifying the possibility of bringing the assessment of the regions to uniformity without loss of quality assessment. The paper applies such a method of evaluation as the calculation of the integral index. This index is based on three independent sub-indices: social, economic and environmental. Indicators most meeting the requirements are selected for each individual sub-index. The paper also evaluates the dependence of the selected indicators in order to avoid reducing the effectiveness of the assessment. Data of a group of regions with a strategy aimed at investing in the extractive industry are used as a basis for calculation, because they most need to improve the environmental condition. The research result is the evaluation of investment strategies of the selected regions. The conclusion about expediency of application of this method of evaluation is made.**

Keywords— *Investment Policy, Investment Strategy, Region, Effectiveness Evaluation, Integral Index*

1. INTRODUCTION

Effective investment management is an essential condition for the region's growth and development. Today, there is no clearly defined state investment policy. Each region presents its own unique investment strategy aimed at increase of the region's investment attractiveness [1]. Although there are certain requirements for an investment strategy, there is no unification. The developed investment strategies of the regions, mainly up to 2025, pursue different goals and offer their indicators to assess the achievement of the set goals or the effectiveness of the investment strategy without taking into account the costs incurred.

A similar situation exists with regard to the evaluation of the implemented strategies. In this area there is a wide choice of evaluation methods both quantitative and qualitative. The methods of financial character [2, 3, 4, 5], cost methods [4, 5], balance models [6, 7, 8], econometric and mathematical models [9, 10, 11], models of situational programming, rating methods [12, 13], indicative, complex estimates [14], other methods which are based on the balance approach, cost, on expert estimates [15] are offered to use. All of these methods suggest a well-developed solution to the problem, but the direction is not found. Due to the fact that the implementation

of the developed investment strategies needs to show its first results, unification of methods of evaluation becomes one of the research priorities in this area.

In public administration the investment strategies' effectiveness evaluation is reduced to the evaluation of experts or to the rating approach. The last one has become so popular in the Russian Federation that the regions use it in their investment strategy as an increase of investment attractiveness among other regions.

At the same time, the research mostly has a practical narrow focus. General theoretical aspects are practically not developed. In this paper we will consider the theoretical development of several of them [7, 12, 16, 17, 18, 19], but the method used in the thesis of Weisberg Ya. A. [20] is the main on.

2. RESULTS AND DISCUSSIONS

The complexity of the unification of the method of investment strategies' evaluation lies in the diversity of the specific conditions of the region. The number of external and internal factors varies from region to region. Ehere is the use of evaluation methods for the group of regions united geographically or according to the Federal structure without taking into account their characteristics. The use of a single assessment of this group is a poor-quality assessment. The aim of this study is to select a method and its application on the example of a group of regions without loss of quality assessment.

The method of calculating of the integral index for assessment of the investment strategy's effectiveness is proposed in this paper. The essence of the method is to find a common integral index which is defined as the average of its sub-indices. This method was used to evaluate the strategic architecture of the public administration system [20], where two sub-indices (social and economic) were evaluated. The integral indicators were used also in other [12] researches. It indicates the convenience of the application of this method of evaluation.

Each sub-index has its own indicators for evaluation. These indicators may have different units of measurement, but for the calculation of sub-indices they are given to the relative indicators in the range from 0 to 1 by scaling.

Direct scaling is performed by the formula:

$$X_i^m = \frac{X_i - X_{min}}{X_{max} - X_{min}} \qquad (1)$$

The inverse scaling will be calculated as 1 minus the forward scaling for indicators with a negative impact. Thus, it is possible to use the index calculation through the relative values of different indicators with different units of measurement.

It is offered to carry out primary selection of regions where the assessment will be made for unification of a method. It is necessary to choose the criterion for the selection of regions on the example of which the method will be applied to achieve this goal. The preference should be given to the regions associated with their chosen strategic goal, but in most cases the regions of the Russian Federation set the goal of overall economic development without going into more detailed directions. It is supposed, if the regions are focused on one type of activity, their main objectives of the investment strategy are similar. While considering the structure of investments in fixed assets by type of economic activity, it is possible to identify regions related, for example, to regions focused on investing in mining. We choose several regions with the largest share of investments in this type of activity.

Regions with a share of investments in mining > 25 %: Irkutsk region (28.9 %), Kemerovo region (29.2 %), Tomsk region (33.6 %), the Tyva Republic (37 %), the Sakha Republic (37 %), Orenburg region (43 %), Astrakhan region (45.8 %), the Komi Republic (46.5 %), Chukotka Autonomous Okrug (68 %), Yamalo-Nenets Autonomous Okrug (68.3 %), Sakhalin region (70.2 %), Magadan region (74 %), Nenets Autonomous Okrug (97.5 %).

The type of activity as mining is chosen because in this case such an important aspect of the result of investment policy as investments in environmental protection measures becomes clearly expressed. The integrated index consists of three independent components: social, economic and environmental.

The presence of strong correlation dependencies is checked while selecting indicators. The correlation coefficient should not exceed 0.7 (the correlation is considered strong above this indicator) according to the selected indicators. The verification of tightness will improve the quality of the evaluation of the investment strategy and widely cover the range of areas that would be taken into account.

The following indicators have been selected for the sub-indices:

1. Social sub-index
    1.1 Migration growth rate per 10,000 population;
    1.2. The number of students enrolled in undergraduate, graduate, master's programs for 10,000 population;
    1.3. Share of dilapidated and emergency housing stock in the total housing stock;
    1.4. Population per a hospital bed;
    1.5. The number of reported crimes per 100,000 population.
2. Economic sub-index

2.1 Real incomes;
    2.2 The level of employment;
    2.3 The index of physical volume of investments in fixed assets;
    2.4 Volume of innovative goods, works and services;
    2.5 The production indices by type of economic activity "Mining" (as a percentage of the previous year).
3. Ecological sub-index
    3.1 Movement of harmful (polluting) emissions substances into the atmosphere from stationary sources;
    3.2. Movement of pollutant discharges into water per 10,000 population;
    3.3 The number of calls to the environmental control bodies;
    3.4 Incidence of diseases of the respiratory system per 1,000 population;
    3.5 The proportion of neutralized waste in the total mass generated waste per year.

Scaling was carried out by the numerical values of the selected indicators to bring the data into a comparable form. The correlation was calculated. A weak correlation between these indicators was revealed excluding some regions. The average correlation for a group of regions is not exceed 0.35. Indicators 2.1 and 2.2 give the strongest dependence. Thus, the selected indicators are mutually independent and can be used in the research. The indicator 3.3 is eliminated from the calculation of the integral index due to a small data set and an insignificant correlation estimate. After this test, we start the calculation of the integral index.

The following values by region were obtained according to the results of the calculation of the integral index:

Table 1. The results of the calculation of integral index

	Social sub-index	Economic sub-index	Ecological sub-index	Result
Kemerovo region	0,55	0,37	0,7	0,54
Tomsk region	0,68	0,29	0,54	0,50
The Komi Republic	0,5	0,44	0,55	0,49
The Sakha Republic	0,58	0,47	0,43	0,49
Yamalo-Nenets Autonomous Okrug	0,51	0,4	0,56	0,49
Orenburg region	0,58	0,33	0,55	0,49
Chukotka Autonomous Okrug	0,52	0,31	0,58	0,47
Astrakhan region	0,52	0,36	0,52	0,47
Magadan region	0,5	0,35	0,47	0,44
The Tyva Republic	0,52	0,32	0,42	0,42
Irkutsk region	0,45	0,32	0,47	0,41
Nenets Autonomous Okrug	0,4	0,38	0,42	0,4
Sakhalin region	0,38	0,25	0,57	0,4

Kemerovo region is the leader in ecological sub-index. Thus it is impossible to tell about good ecological situation in the region. In this case, such indicators as the movements of emissions and discharges of harmful (polluting) substances have a significant impact. Kemerovo region has the large

values of pollutant emissions into the atmosphere compared to such regions as the Chukotka Autonomous Okrug and the Tyva Republic, where the volume of pollutant discharge is less in 70-130 times, but these changes are persistently negative. Therefore, it is possible to talk about the feasibility of investments in environmental protection measures. If the total emissions and discharges were used as indicators 3.1 and 3.2 the results of the research would be quite different but not changes over time.

The leader in the economic sub-index was the Sakha Republic. This region is characterized by high incomes, high employment and rich natural resources. A stable social situation creates a favorable investment climate. Since the Sakha Republic plays a leading role in the extraction of minerals in Russia (for the extraction of diamonds over 90 %, gold 24 %), it is the leader in the index of production of this type of economic activity. The Sakha Republic shows the richest prospects for economic development among the regions in the industry. Indicator 2.4 had no particular impact on the outcome. It was difficult to expect highly intelligent products from regions with a commodity economy. However, this indicator is not excluded from the research because of the prospects for development.

In the social sphere Tomsk region is a leader. Indicators 1.1 and 1.2 have the main influence on the city of students. A large gap occurred in terms of migration growth. This region is practically the only one with positive changes.

3. CONCLUSION

The evaluation of investment strategies covers a wide range of investment areas. But it shows adequate results on detailed examination. It is important to be guided by the main purpose of the assessment while choosing the indicators. The aim of this research was to identify the effectiveness of the regional investment policy with regard to its activity and the investments feasibility. At the same time, if we talk about regions with the investment strategy aimed at innovative development, the impact of indicators 3.1 and 3.2 have not such effect, because they hardly change with time. In practice, the neglect of areas such as waste management by public administration can make it be outsider. Thus, the attention of the Executive authorities is monitored through this assessment not only on the financial spheres of the region's development.

This method of applying the assessment with the division of the total number of regions into subclasses according to their chosen direction of the strategy involves its unification. The division of Russian regions into subclasses in the direction of investment policy will allow to choose the best indicators for each individual subclass. It will improve the quality of the assessment and eliminates insignificant indicators for this direction. It will allow to focus on the main problems of the industry development (for example, such indicator as "respiratory diseases" is suitable for regions with a predominant share of the extractive or metallurgical industry in economy, not with agricultural production).

References

[1] Innovative economy in the 21st century: monograph / edited by Yu. N. Kleshevskiy, I. A. Kudryashova. Kemerovo Institute (branch) of RSUTE, Kemerovo, 354 p. (2013)

[2] Bilous, K. M., Vodopyanova, N.A.: State strategic management of investment activities. Proceedings of Volgograd Sate Pedagogical University No. 3, pp. 87-92 (2008)

[3] Kustov, D. A.: Methodological aspects of formation and realization of regional investment strategy. Russian Entrepreneurship No. 12 (1), pp. 168-172 (2009)

[4] Meteleva, M. A.: Improvement of management tools implementation of the investment strategy as a factor of increase of efficiency of regional innovative infrastructure (on the example of Kemerovo region). Russia and the new economy: key vectors of development, proceedings of The international scientific-practical conference within the all-Russian festival of science: in 2 parts, pp. 196-203 (2016)

[5] Speshilova, N. V., Singaeva, Yu. V., Sadykova, Yu. A.: Modern efficiency valuation methods of investment projects of the region. Scientific Mechanisms of Solving Problems of Innovative Development, pp. 116-124 (2017)

[6] Voloshenko, K. Yu., Kuznetsova, A. L.: Experience of the development and application of the balance model of regional development management in specific territorial conditions. Publishing house of the BFU named by I. Kanta, Baltic Region No. (21), pp. 7-26 (2014)

[7] Myakshin, V. N.: Factors of investment attractiveness of the region and their evaluation. Regional Economy: Theory and Practice No. 14, pp. 23-33 (2014)

[8] Sergienko, A. V.: Balanced approach in strategic management. Economic Analysis: Theory and Practice No. 11, pp. 52-59 (2012)

[9] Zhukov, A. V.: The model of multicriteria evaluation of the optimal strategy for the development of the subject of the economy. Economic Studies No. 1 (2010)

[10] Panyagina, A. E.: Methods of assessing the achievement of the strategic objectives of increase of investment activity in the region. Siberian Financial School No. 4 (117) pp. 176-179 (2016)

[11] Uskova, T. V., Selimenkov, R. Yu., Asanovich, V. Ya: Avaluation of the implementation of the regional development strategy. Economic and Social Changes: Facts, Trends, Forecast, Vologda region No. 1 (37), pp. 30-42 (2015)

[12] Myakshin, V. N.: The methodology of balanced assessment of investment attractiveness of the region. Bulletin of the Northern Federal University, Series: Humanities and Social Science No. 6, pp. 110-117 (2013)

[13] Suldina, G. A., Hamidulina, A. M.: Assessment of the balance of socio-economic development of municipalities in the region. Economic Sciences No. 87, pp. 244-248 (2012)

[14] Kholosha, A.V.: Effective management of the region's economy as a priority of regional socio-economic policy at the present stage of development of the Russian Federation. The Economics of Sustainable Development No. 3 (31), pp. 131-139 (2017)

[15] Bychkova, S. M., Makarova, N. N., Zhidkova, E. A.: Analysis of investment strategy from the perspective of stakeholder theory. Accounting. Analysis. Audit No. 1, pp. 33-38 (2017)

[16] Bezrukov, B. A., Zabudkov, V. A.:.Methodical bases of an estimation of investment strategies efficiency. Current research areas of the 21st century: theory and practice Vol. 5, No. 3 (29), pp. 137-142 (2017)

[17] Morozova, N.V., Bondarenko, N. V.: Approaches to evaluating the effectiveness of regional strategies for socio-economic development. Journal Chuvash University, No. 3, pp. 178-182 (2014)

[18] Shvets, Yu. Yu.: Methodological approaches to assessing the possibility of implementing innovative strategies. The culture of the peoples of Circum-Pontic region No. 197-1, pp. 84-87 (2011)

[19] Weisberg, Ya. A.: Evaluation of the effectiveness of the strategic architecture of the public administration system of territory's socio-economic development. Thesis, Siberian Academy of Finance and banking, Novosibirsk, 258 p. (2014)