QUANTITATIVE EVALUATION OF ECONOMIC AND SOCIAL DEVELOPMENT OF LITHUANIAN REGIONS

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Many European countries are faced with the problem of regional disparities when the level of social and economic development of particular regions is dramatically different. This causes social conflicts. In developing the effective regional policy one of the most important conditions is the identification of the actual level of development of a region. This problem may be solved if economic, social, political, legislative, ecological and other factors influencing regional development are taken into consideration. For this purpose, a comprehensive system of criteria should be developed, with their subsequent integration into a unified criterion.

In the present paper, a set of criteria for evaluating regional development based on practical expertise and theoretical analysis is suggested. They embrace economic, innovational, social and other aspects of development.

The criteria reflecting economic and social development of a region are multidimensional and of opposite directivity, therefore, they are normalized in accordance with the aggregation technique used.

Keywords: regional development, criteria of development evaluation, multicriteria analysis

1. Introduction

The economy of Lithuania, which reached the final stage in creating free market relations, undergoes an essential restructuring. However, in pursuing this policy the state is faced with the problem of regional development, which,

if not solved, may give rise to a number of complicated social problems. Investments are mainly made into the development of large cities, which are the centres of industry, social life and qualified labour force, while smaller towns and regions are getting poorer. The gap

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between social and economic development of particular regions is getting larger, causing the growth of unemployment, crimes and social tension.

In fact, this situation is common to all future member states of the European Union. However, these countries supported by the EU take actions aimed to reduce or eliminate the differences in economic and social development among the regions. These actions are financed both by the EU and from national budgets.

In pursuing this policy, a special mechanism should be developed to ensure its high efficiency in reducing the gap among various regions, especially when the financing is made from the state budget. To achieve this, the following practical and theoretical problems should be solved: a concept of a region, its boundaries and growth should be formulated, the criteria reflecting the development of a region should be defined, the degree of the actual region development should be determined and the data obtained should be used in developing and pursuing the regional policy.

2. Regionalization
of the territory of Lithuania

The term 'region', though frequent in the literature, is used differently by various authors. The problems associated with its nature and meaning, objective or subjective character, etc. are still open to discussion. In a general sense, a region is an area or division, especially part of a country having definable characteristics which differentiate it from the surrounding areas [1]. On the other hand, the criteria and procedures used to delimit it are subjective, therefore any regionalization may hardly be considered objective.

A concept of a region may become more clear if we consider its use in various branches of science and politics, including geography, politology, sociology, ethnography and economics [1]. In geographical terms, a region is a relatively uniform part of surface having specific geographical features differentiating it from the neighbouring areas, such as a territory, soil, climate, etc.

In terms of politology, the essential features of a region are the unique character of political options, popularity of particular political doctrines, autonomy within a federal state, acknowledgement of an administrative-territorial division, efficient regional administration, etc. In sociological terms, the criteria relevant for region delimitation are the identity of the population, integrity of the local community, sense of exclusiveness, especially in relations with other areas, emotional links with the so-called "small native country", etc. Specific features of a region are linguistic (language, dialects, jargon), cultural (crafts, clothes, customs and traditions) and other pecularities.

In economic terms, a region is primarily an outlined area with a particular economic development resulted from the use of internal and external resources, such as capital, labour force, information, etc.

In fact, it is hardly possible to outline a region considering it only from geographical, political, ethnographic or sociological perspectives. All these interconnected and individual features are integrated in the economic concept of a region. On the other hand, this approach can hardly be applied to setting the boundaries of a region when planning its development and administration. Therefore, for practical purposes, a region is usually perceived as a unit of the territorial and administrative division of a particular state. In this case, a district, a province, a land, etc. may be referred to as a region. In Lithuania, territorial and administrative division was adopted and ten regions

were formed, such as Alytus, Kaunas, Klaipėda, Marijampolė, Panevėžys, Šiauliai, Tauragė, Telšiai, Utena and Vilnius.

3. A set of criteria for quantitative evaluation of regional development

As mentioned above, regions of a particular country may be treated as geographical, ethnographic, political and economic phenomena. In terms of a regional growth, the first two (i.e. geographical and ethnographic) aspects are basic or static characteristics, because they serve as a basis for forming the space where the processes of regional development are considered.

Three other (political, social and economic) aspects are the dynamic characteristics of a region allowing us to identify its political, social and economic development. However, analysis shows that the political development of a region essentially differs from social or economic development. At a regional level there can hardly be any political development significantly different from that of other regions, because local authorities pursue the same state policy irrespective of the extent of regional autonomy. Therefore, we can deal only with regional, social and economic development involving a political aspect.

If a region is considered as a dynamic social and economic system, then it may be described in terms of a particular development level achieved at a particular moment of time. This approach allows us to consider a state as consisting of underdeveloped, developing and highly developed regions.

The problem arises whether we can further reduce the number of aspects of regional development, restricting ourselves to the analysis of only one, say, a social and economic dimension. To resolve this problem, a region should be considered in the context of a systems theory.

In this case, a region as an economic and territorial system may be described in terms of its structure possessing the following features: reasonable organization, hierarchical management, relative inaccessibility and openness with respect to the surrounding territories, availability of a particular amount of exogenic and endogenic resources and the possibility to turn them into goods and services, as well as the possibility to set the goals and choose the activities aimed to achieve them.

The economy of a region should not be regarded upon as an object of macro- or microeconomics. This is a specific area the functioning of which may be modelled only in terms of mesoeconomics – a part of a general economic theory filling the gap between macro- and microeconomics [2].

In a region considered as an object of mesoeconomic study, the same trends of development as in the whole country and specific tendencies may be observed. Regional economy is not a small copy of the state economy. It is influenced by the environment and is actively interacting with it. On the other hand, in its economic activities a region is autonomous to a certain extent which allows it to achieve the results differentiating it from other regions.

However, regional economy should not be treated as a large enterprise, a corporation or a monopoly pursuing the goal of getting a long-term maximum profit. The aims and activities of regions and large corporations as well as their links with the environment are essentially different. The relations between regions cannot be described by the models used in market economy analysis aimed mainly at decision-making.

Regional development does not depend only on economic growth, it is affected by a

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number of other factors which make it more comprehensive, dynamic and effective. Today it is clear that the increase of production is not the only means of solving social and economic problems. Moreover, it may have some negative effects, including a larger gap between the living standards of various groups of inhabitants, heavy pollution of the environment, tension in interpersonal relations, etc.

A large amount and higher quality of manufactured goods and provided services resulting from economic, technical and technological advance make a basis of raising the living standard of the population of a particular region. In general, it means that the social development of a region is closely connected with its economic development.

Economic and social activities in a region have a direct impact on the environment, therefore we may also identify a concept of ecological development. Today the economy and social life of a region cannot develop at the expense of the environment. Economic and social development reflects quantitative characteristics of processes, while ecological development is associated with their qualitative parameters being, therefore, an integral part of a concept of economic and social development and reflecting its qualitative aspects.

Summing up, it is possible to state that the development of a region involves two closely related social and economic aspects reflecting an integral concept of regional development.

It follows that a set of criteria to describe regional development should be based on the criteria reflecting its social and economic progress. These can be obtained taking into account the major aspects of regional development [1].

The first and the most important one includes quantitative, qualitative and structural elements making a basis for the development in all other areas of activities.

Regional development involves technical and technological changes, therefore, it should be the second aspect to be considered.

The third aspect is the development and transformation of a community because the provision of better and more varied products and services results in a higher living standard of the population.

The fourth aspect closely related to the previous one is the impact on the environment.

Taking into account these four main aspects we can derive a set of criteria of regional development (Table 1).

The factors of economic and social development of a region given in Table 1 may be used as a basis for developing a set of criteria describing regional development.

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The criteria reflecting economic development of a region may be as follows [3–7]:

1. Gross national product (GNP), brutto per capita.

2. Value added, brutto per capita.

3. Manufactured products sold per capita.

4. Building products sold per capita.

5. Agricultural products bought per capita.

6. The number of employees per capita.

7. Level of unemployment.

8. Investments per capita.

9. Registered enterprises per 1000 inhabitants.

10. Registered joint-stock companies with foreign capital per 1000 inhabitants.

11. Annual revenue of local budget per capita.

12. Retail sales per capita.

The major criteria used to assess the innovational aspect of regional development may be described as follows:

1. Investment into research and development per capita.

2. Investment into the innovations in industry.

Table 1. Major factors of economic and social development of a region (formulated by the authors based on [1, 3–7]

Aspects of regional development	Major factors of regional development
1. Economic	Amounts and kinds of goods and services provided in a region, trends of labour force market development, dynamics of a regional advertising system and its restructuring, changes in the sources of income of inhabitants, functioning of the local government institutions and enterprises, growth of a region's own capital and local and foreign investments, quality of a regional marketing system, level of regional management, macroeconomic indicators (rate of national economic development, inflation, monetary and budgeting policy of the state, currency exchange rate, etc.), macroeconomic development in foreign countries, financial support from foreign organizations including the EU, etc.
2. Innovational	Growth and structural changes of a region's own capital, modernization level of enterprise equipment, research and development level, qualitative differentiation of goods, the development of high technologies, the improvement of production methods, raising the quality of products, innovations in technology and industry, the development of infrastructure, etc.
3. Social	Natural growth and structural changes in the population, the rate and tendencies of urbanization, agglomeration and metropolization processes and social stratification, changes in the lifestyle, living standards and education of people, cultural level of the population, attitudes of regional authorities and the community to business development and innovations, functioning of the local government institutions and participation of the community in raising and solving regional and local problems, etc.
4. Ecological	Use of natural resources, changes in the environment protection policy, ecological awareness and culture of the population, ecological education, the efficiency of economic and other tools used to protect the environment, etc.

3. The number of people employed in research and development per 1000 inhabitants.

4. The number of students per 1000 inhabitants.

5. The number of research workers per 1000 inhabitants.

6. The number of patents per 1000 inhabitants.

7. Inhabitants with higher education, % of the total number.

8. The number of higher schools and research institutes per 1000 inhabitants.

9. Area of exhibition halls and shopping centers, m^2 per 1000 inhabitants.

The criteria reflecting social development of a region are as follows:

1. The number of inhabitants per 1 km^2 area.

2. Urban population, % of the total number of inhabitants of a region.

3. Migration balance per 1000 inhabitants.

4. Infant mortality per 1000 inhabitants.

5. The number of inhabitants per doctor.

6. Apartments built per 1000 inhabitants.

7. The number of automobiles per 1000 inhabitants.

8. Length of paved roads (km) per 100 km² of the region's territory.

9. Local government budget share per capita.

10. Tenant association budget share per capita.

11. Average monthly insurance payments.

12. Average monthly pensions and rents paid from insurance companies of the agricultural sector.

The major criteria characterizing the ecological development of a region may be as follows:

1. Investment into the environment protection per capita.

2. Dust emissions into the air per 1 km² of the region area.

3. Gas emissions into the air per 1 km² of the region area.

A list of criteria describing regional economic and social development may vary depending on a particular country or region described. Moreover, some issues may be added or removed from it, depending on the situation.

4. Quantitative evaluation of economic and social development of Lithuanian regions

In the EU member states, regional development is usually perceived as the growth of competitiveness quantitatively evaluated via competitiveness indices. In the recent years, this phenomenon has been increasingly growing in importance. Competitive ability is defined as the ability of manufacturing goods and providing services meeting the international market standards, while maintaining high income and employment level [8, 9]. It is

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often considered to be a major indicator of the efficiency of the current economic policy. The major criterion of evaluating competitiveness is gross national product (GNP) per capita [8].

In such calculations economic and technological aspects of regional development are emphasized. However, regional development is a much wider and more complex concept than the growth of the competitive ability, because it includes social and ecological aspects of development as well. Some other approaches treat a region as a state, thus comparing the development of various countries [2, 8–11]. The above methods can hardly be used for the analysis of regional development, because they focus on microprocesses. Regions of a particular country do not depend on the macro- and microeconomic levels attained, therefore, their analysis needs an essentially different set of criteria [3–5, 7, 12], taking into account the economic, political, social, ecological, legal and other aspects. The criteria based on them may have different dimensions and may be oriented in different directions (for example, the growth of one criterion may mean the improvement, while the increase of another the worsening of the situation).

To determine the extent of regional development under such uncertain and even conflicting conditions, complex methods based on multicriteria evaluation should be applied [3, 4, 12–16].

In this case, quantitative evaluation of social and economic development of regions is based on a system of generated criteria. The main objectives are to normalize these multidimensional criteria, as well as to determine their values and weights and to combine them into a single aggregating criterion. A major concern was to obtain the information relating to a set of criteria. The data were taken from the work "Lithuanian regions: social and economic development" [6] published by the Statistical Department of Lithuania (see Table 2).

o	Criterion	Units of measure	Alytus	Kaunas	Klaipėda	Marijam-polė	Panevėžys	Šiauliai	Tauragė	Telšiai	Utena	Vilnius
1.	Migration balance (per 1000 inhabitants)	quantity	0.331	0.378	-0.018	0.887	- 0.655	- 0.545	- 1.131	- 0.142	0.517	1.089
2.	Annual revenue of local budget (per capita)	litas	1.040	0.938	1.123	1.014	0.950	0.986	1.029	1.052	1.150	0.978
3.	Expenses of local budget for social needs (per capita)	litas	19.95	13.66	16.43	18.60	20.12	26.80	30.60	21.97	17.33	16.33
4.	Unemployment level	%	8.6	4.6	5.1	8.0	7.6	9.0	8.8	6.4	7.0	5.7
5.	Average salary (per month)	litas	844	865	950	755	851	807	724	936	982	1061
6.	Total useful living space (per capita)	m²	22.2	22.5	19.5	19.7	22.8	21.0	21.4	21.0	24.4	19.6
7.	Places at primary schools (for 100 children)	number	88	80	84	71	89	86	79	73	93	86
8.	Places at secondary schools (for 100 children)	number	4.79	3.49	3.72	5.65	4.69	4.22	5.79	4.41	5.29	3.29
9.	Diary products (100 ha)	100 kg	1314	1189	1133	1252	1039	1143	1289	1084	943	1428
10.	Products sales including VAT and excises (per capita)	litas	4847.2	4708.8	5445.5	2782.1	5185.6	2548.5	847.3	2009.5	2681.7	3284.2
11.	Retail sales (per capita)	litas	1927.0	4999.5	3917.9	2904.1	2870.8	3410.2	2306.3	4177.8	2078.4	6776.3
12.	Material investments (per capita)	litas	1138.3	1393.2	3294.1	737.5	1489.0	949.1	356.3	2144.2	1440.0	2457.3
13.	Building products (per capita)	litas	820.3	916.4	1003.9	437.9	848.7	546.0	202.3	1166.3	900.2	1248.0
14.	Investments into housing (per capita)	litas	109.31	143.03	97.50	109.31	102.77	83.26	110.53	85.12	84.25	225.97
15.	Bed-days in municipality foster house (per 1000 inhabitants)	number	16.62	16.12	73.63	8.27	6.12	9.24	4.78	7.28	9.57	53.46
16.	Registered crimes	number	135	215	245	174	216	176	172	154	135	250

The aggregation of the values of individual criteria into a single quantitative criterion for evaluating the economic and social development of various regions is feasible if the values do not depend on the units of measurements and their variation intervals are the same.

For this purpose, the initial matrix R with the elements r_{ij} (i = 1, 2, ..., m; j = 1, 2, ..., n; in our case, m = 16, n = 10) is normalized with respect to every i-th criterion for all regions n.

Let us denote the elements of the normalized matrix $\widetilde{R}$ as $\widetilde{r}_{ij}$. The quantitative methods of performance evaluation are essentially different, therefore their authors suggest various methods for the normalization of the criteria values and various scales of measurement.

The normalization methods used in the present paper and a possible variation of measures are described below. Note that not in all cases $\sum_{j=1}^{n} \widetilde{r}_{ij} = 1$ (i = 1, 2, ..., m).

For a complex evaluation of the development of various regions of Lithuania various quantitative methods were used. All these approaches are different, because they characterize the regions from various perspectives.

Multicriteria analysis can yield more reliable results.

A major goal of each multicriteria method is ranking the alternatives (here, regions) in the decreasing order of the values of the criteria used.

When the alternatives get the same positions in a ranking list according to the principle of "the majority of criteria", a decision-making procedure may be considered reliable. When this condition is not satisfied, expert evaluation is needed.

In the present paper, the following methods are used:

1. The total of all criteria rankings for each j-th region [3, 4] calculated from the formula:

$$V_j = \sum_{i=1}^{m} m_{ij} \qquad (j = 1, ..., n), \qquad (1)$$

where m_{ij} is the position (ranking) of the i-th criterion for the j-th region ($1 \leq m_{ij} \leq m$, $m_{ij} \in N$). The least value V_j refers to the most highly developed region. When several values m_{ij} are the same, every region is given the same ranking which is an arithmetic mean of their rankings, For example, if three regions have the same criterion values and obtained the positions 3, 4 and 5 in a ranking list, then all the three regions get the same value (position), $m_{ij} = 4$; if the same values correspond to the positions 8 and 9, then both regions are given the value 8.5. The values V_j do not depend either on the normalization method of the initial data or on the criterion weights w_i (i = 1, 2, m). The value V_j is most primitive and, therefore, is used for the preliminary visual evaluation of the alternatives.

2. Simple Additive Weighing Method (SAW) [4, 11] represents the sums of weighted normalized values of all m criteria for the j-th region calculated from the formula:

$$S_j = \sum_{i=1}^{m} \omega_i \widetilde{r}_{ij} \quad (j = 1, ..., n), \qquad (2)$$

where w_i is the weight of the i-th criterion. In preliminary calculations all weights w_i are the same

$(w_i = \dfrac{1}{m})$.

SAW is based on the most standard normalization of the initial matrix R:

$$\widetilde{r}_{ij} = \frac{r_{ij}}{\sum_{i=1}^{n} r_{ij}} \quad (i = 1, ..., m; j = 1, ..., n), (3)$$

here, r_{ij} is the value of the i-th criterion for the j-th region.

In rough calculations the weights of all criteria may be assumed to be the same, i.e.

$\omega_1 = \dfrac{1}{16} = 0.0625$. The best value of the criterion S_j will be the highest value.

3. The geometric of mean of normalized values of all criteria is $\check{S}_j$. It is found from the formula [4, 12]:

$$\Pi_j = \sqrt[m]{\prod_{i=1}^{m} \omega_i \tilde{r}_{ij}} \quad (j = 1, ..., n) \qquad (4)$$

The order of region priorities determined by the above formula (4) does not depend on the criteria weights w_j, therefore, this value is not introduced into the formula. The highest value of the criterion Π_j is the best.

4. The criterion of proportional evaluation [15, 16]. Its value can be obtained from the formula:

$$Z_j = S_{+j} + \dfrac{S_{-min} \sum_{j=1}^{n} S_{-j}}{S_{-j} \sum_{j=1}^{n} \dfrac{S_{-min}}{S_{-j}}} \quad (j = 1, ..., n) \quad (5)$$

here, $S_{+j} = \sum_{i=1}^{m} \omega_i \tilde{r}_{+ij}$ is a sum of the weighed values $\tilde{r}_{+ij}$ for all m regions of the j-th maximizing criteria for which the highest value is the best. $S_{-j} = \sum_{i=1}^{m} \omega_i \tilde{r}_{-ij}$ is the sum of the j-th minimizing criteria (their minimal value $S_{-min} = \min_j S_{-j}$).

5. Basing ourselves on the proportional evaluation criterion, we suggest its simplified version allowing the values of the criterion Z_j to be found much easier and faster (even without using a computer). If we simplify the addendum of the formula (5) by canceling S_{-min}, and place outside the summation sign $\max S_{-j} = S_{-max}$ in the numerator and

$\max\limits_j \dfrac{1}{S_{-j}} = \dfrac{1}{\min\limits_j S_{-j}} = \dfrac{1}{S_{-min}}$ in the denominator, then the expression of the criterion Z_j will be transformed as follows:

$$Z_j = S_{+j} + \dfrac{\sum_{j=1}^{n} S_j}{S_{-j} \sum_{j=1}^{n} \dfrac{1}{S_{-j}}} =$$

$$= S_{+j} + \dfrac{S_{-max}(\dfrac{S_{-1}}{S_{-max}} + ... + 1 + ... + \dfrac{S_{-n}}{S_{-max}})}{S_{-j} \dfrac{1}{S_{-min}}(\dfrac{S_{-min}}{S_{-1}} + ... + 1 + ... + \dfrac{S_{-min}}{S_{-n}})},$$
$$(6)$$

The relationships given by the numerator and denominator of formula (6) are practically the same, therefore, the criterion Z_j will be of the form

$$Z_j^{\bullet} \approx S_{+j} + \dfrac{S_{-max} S_{-min}}{S_{-j}} \qquad (7)$$

The calculations have shown that Z_j and Z_j^* are practically the same, and the priority order assigned is also the same in both cases.

In calculating the values of the criteria Z_j and Z_j^*, the following normalization method is used [15, 16]:

$$\tilde{r}_{ij} = \dfrac{\omega_i r_{ij}}{\sum_{i=1}^{n} r_{ij}} \quad (i = 1, ..., m; j = 1, ..., n), (8)$$

here, ω_i _ weight of the i-th criterion.

The data obtained in multiple criteria evaluation of regional economic and social development according to the above five methods are given in Table 3.

In the upper part of the table preferences of regional development determined without considering the weights of criteria are presented, while in the lower part of the table the

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Table 3. Table of complex evaluation of regional development

Methods of evaluating economic and social development of regions	Regions									
	1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
Without the criteria weights										
According to the total rankings	4	6	1	10	7	9	8	5	3	2
SAW	5	3	1	10	6	8	9	4	7	2
According to geometrical mean	4	3	2	9	6	8	10	5	7	1
Proportional evaluation method	4	3	2	8	6	9	10	5	7	1
Simplified proportional evaluation method	4	3	2	8	6	9	10	5	7	1
GNP per inhabitant of the region	8	3	2	9	4	7	10	6	5	1
With the criteria weights SAW	6	4	2	9	7	8	10	3	5	1
Proportional evaluation method	7	4	2	9	5	8	10	3	6	1
Simplified proportional evaluation method	7	4	2	9	5	8	10	3	6	1

results obtained with the weights of criteria taken into consideration are given. The weights of criteria (Table 4) are determined by T. Saaty's pairwise comparison approach [17, 18].

Data in Table 3 show that the calculation results of regional, economic and social development differ depending on the evaluation method used. Another conclusion may be drawn that the accuracy of calculations is higher when the weight of the criteria is taken into account.

To determine the feasibility of the calculation methods used, analysis of the spread of the regions' positions determined according to their social and economic development should be made. The calculations will be performed according to the formula:

$$\Delta K_j = \sum_{s=1}^{L} \left| \overline{K} - K_s \right|, (j = 1, ..., n) \qquad (9)$$

here, ΔK_j of the the total deviation of the j-th region position from the average value calculated by all the methods used, $\overline{K}$ is the average value of the region position calculated by all methods, K_s is the region position determined by the s-th multicriteria evaluation method, n is the the number of regions ($j = 1, 2, ... n$).

The data obtained in the calculations are presented in Tables 5 and 6. In Table 5 one can see that if the weights of criteria are not taken into account, the lowest deviations are observed when the geometrical mean of all criterian normalized values Π_j and proportional evaluation Z_j (and simplified proportional evaluation Z^*_j) are used. The highest deviations are found by the method relying on the sum of the rankings of all criteria V_j and

Table 4. Table of criteria weights

Criterion No.	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*	*16*
Weights	0.0077	0.0682	0.0470	0.0110	0.0138	0.1024	0.0682	0.0682	0.0470	0.0269	0.0199	0.1896	0.1763	0.0997	0.0470	0.0077

the weighed sum of normalized criterion values S_i (SAW). In this table, a comparison with the results based on the criterion used in the EU countries, GNP per inhabitant of a region, is given. The data confirm the statement that the latter criterion cannot adequately reflect the social and economic development of a region, implying that the evaluation of regional development based on competitiveness considerably differs from that taking into account economic and social aspects of regional development. Even more interesting conclusions may be made on the basis of the results obtained in the present investigation taking into account the weights of criteria (Table 6).

Considering the calculations made according to formula (9), we can see that the evaluation of regional development based on

Table 5. Comparison of multicriteria evaluation methods of social and economic regional development without the criteria weights

Region	Multicriteria evaluation methods					
	According to rankings	*SAW*	*According to geometrical mean*	*Proportional evaluation method*	*Simplified proportional evaluation method*	*GNP per inhabitant of the region*
1	0.2	0.8	0.2	0.2	0.7	3.8
2	2.4	0.6	0.6	0.6	0.6	0.6
3	0.6	0.6	0.4	0.4	0.4	0.4
4	1	1	0	1		0
5	0.8	0.2	0.2	0.2		2.2
6	0.4	0.6	0.6	0.4	0.6	1.6
7	1.4	0.4	0.6	0.6	0.6	0.6
8	0.2	0.8	0.2	0.2	0.7	1.2
9	3.2	0.8	0.8	0.8	0.8	0.2
10	0.6	0.6	0.4	0.4	0.4	0.4
Total:	10.8	6.4	4	4.8	4.8	11

Table 6. Comparison of multicriteria evaluation methods of social and economic regional development taking into account the criteria weights

Region	Multicriteria evaluation methods			
	SAW	*Proportional evaluation method*	*Simplified proportional evaluation method*	*GNP*
1	0.7	0.3	0.3	1.3
2	0	0	0	1
3	0	0	0	0
4	0	0	0	0
5	0.3	0.7	0.7	1.7
6	0	0	0	1
7	0	0	0	0
8	0	0	0	3
9	0.7	0.3	0.3	1.7
10	0	0	0	0
Total	2.7	0.3	1.3	8.7

the criterion value and weight is much more precise, because the deviations from the average value are considerably lower. Another conclusion is that two methods not taking into consideration the weights of criteria, i.e. the total of rankings of all criteria V_j and the geometric mean of normalized values of all criteria L_j, are not suitable. Three methods of complex multicriteria evaluation – weighted sum of normalized criterion values S_i (SAW), proportional evaluation Z_j and simplified proportional evaluation Z^*_j are equally applicable.

Let us make a comparative analysis of these three methods and apply the approach based on GNP per capita:

$$S_i = | \overline{K}_i - K_{BVP} |, \ (10)$$

here, S_i is the the value obtained for the i-th criterion by comparing the calculations of economic and social development based on GNP per capita and three multicriteria evaluation methods for the i-th region, $\overline{K}_j$ is the average value of regional development evaluation by three methods for the j-th region, K_{GNP} is the GNP-based regional development estimate.

The above comparative analysis allows us to decide upon the GNP criterion applicability for evaluating regional economic and social development (Fig. 2).

Basing ourselves on the data given in Fig. 2, we can state that GNP may be mainly applied as a criterion to identify the most highly developed and the least developed regions. Therefore, it may be relied upon in allocating the EU financial support to the regions. The state policy towards regional development should rather be based on complex multi-criteria approaches to evaluating their growth.

Now it is possible to consider the problem of the efficiency of currently taken actions, i.e. to answer the question if they can help to reduce the gap between social and economic development of various regions. For this purpose, a correlation regression analysis was made. The relationship between the emergency Lithuanian state budget expenses and the direct foreign investments and regional social and economic development was established [3]. The obtained data showed that the most highly developed regions got much better financing. In the case of foreign investments, it could be explained by the fact that investors
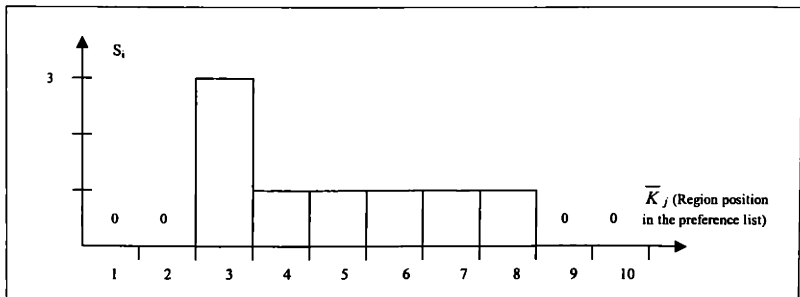

Fig. 2. Graphical representation of the level of economic and social development of regions determined by GNP-based approach and the selected complex multicriteria evaluation methods

are free to choose where to invest their money. They usually prefer enterprises with a highly developed infrastructure in the sectors of economic and cultural development. However, in the case of state emergency expenses, such policy can hardly be justified. Therefore, the calculations made in the present investigation show that the regional state policy is ineffective.

Conclusion

The territorial and administrative division of a country is the most relevant factor establishing the borders of a region. It may be used in planning and managing regional development. This division also reflects geographical, political, sociological, ethnographical and economic features. Analysis shows that the economic and social characteristics of regional development are central to this process, allowing us to outline the concept of the economic and social development of a region.

Regional development is often perceived as the growth of competitiveness, though, in fact, it is a wider and more complex concept. Regional development involves economic as well as social and ecological development providing good conditions for increasing the competitiveness of a region. Now, in the EU countries, the major criterion used to evaluate regional development is GNP per capita though it should rather be applied to describe the competitiveness of a region, because in this case economic growth is emphasized.

Regional social and economic development may be described from various perspectives using different criteria, often oriented in different directions. Therefore, to determine the actual growth of a region, multicriteria approaches should be used.

To decide upon the applicability of various multicriteria evaluation methods to determine the level of regional economic and social development, calculations were made by using five different methods. Analysis has shown that the most appropriate and equally precise are SAW, proportional and simplified proportional evaluation methods. The approach based on GNP per inhabitant of the region should rather be used to identify the most highly developed and the least developed regions.

The calculations made for Lithuanian regions have shown that the current state policy of regional development is ineffective, because the emergency funds are allocated to the most highly developed regions.

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LIETUVOS REGIONŲ EKONOMINĖS IR SOCIALINĖS PLĖTROS KIEKYBINIS ĮVERTINIMAS

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Santrauka

Kai šalies ūkis iš esmės restruktūrizuojasi ir persitvarko, padidėja ekonominiai ir socialiniai jos regionų skirtumai. Mažinant šiuos skirtumus susiduriama su daugeliu mokslui ir praktikai aktualių spręstinų klausimų – regiono supratimas, jo ribų nustatymas, plėtros supratimas, kiekybinis jos vertinimas ir kt.

Regiono, kaip sąlyginai vienalytės žemės paviršiaus dalies, išskyrimas remiantis įvairiais aspektais (geografiniu, politiniu, etnografiniu, sociologiniu, ekonominiu) neleidžia tiksliai nustatyti jo ribų, o tai yra būtina planuoti ir valdyti regiono plėtrą. Todėl mokslo ir praktikos tyrimo objektu paprastai pasirenkamas šalies teritorinis-administracinis suskirstymas.

Analizė rodo, kad kalbant apie regiono plėtrą prasminga pabrėžti du jos aspektus – ekonominį ir socialinį, kadangi jie integruoja kitus – politinį, ekonominį ir pan.

Regiono ekonominę ir socialinę plėtrą apibūdinančių rodiklių kompleksas išplaukia iš esminių jo plėtros aspektų – ūkinio, arba ekonominio, techninio-technologinio, arba inovacinio, visuomeninio, arba sociologinio, bei iš ekologinio. Atitinkamai minėtą rodiklių kompleksą sudaro keturios sudedamosios dalys – ūkinė, inovacinė, visuomeninė ir ekologinė plėtra. Šie rodikliai yra skirtingų dimensijų, veikia skirtingomis kryptimis, todėl kompleksiškai juos jungti galima tik naudojant specialius daugiakriterinio įvertinimo metodus.

Sprendžiant apie įvairių dabar naudojamų sudėtingų reiškinių daugiakriterinio įvertinimo metodų tinkamumą regionų ekonominei ir socialinei plėtrai nustatyti, skaičiavimai atlikti pagal penkis metodus:

1) visų rodiklių vietų sumos kiekvienam regionui metodas;

2) visų rodiklių pasvertų normalizuotų reikšmių sumos kiekvienam regionui metodas;

3) visų rodiklių normalizuotų reikšmių geometrinis vidurkis;

4) proporcingo įvertinimo metodas;

5) supaprastintas proporcingo įvertinimo metodas.

Lietuvos regionų plėtros prioritetai buvo nustatyti:

a) neįvertinant rodiklių svorių (su vienodais svoriais);

b) įvertinant rodiklių svorius remiantis T. Saaty porinio lyginimo metodu.

Skaičiavimai parodė, kad geriausių rezultatų gaunama, kai įvertinamas rodiklių svoris.

Analizė parodė, kad vienodai tikslūs ir labiausiai tinkami yra trys – pasvertų normalizuotų rodiklių sumos, proporcingo ir supaprastinto proporcingo įverti-nimo metodai. BVP, tenkantis vienam regiono gyventojui, palyginti su šiais metodais, tinkamiausias nustatyti labiausiai išsivysčiusius ir labiausiai atsilikusius regionus.

Skaičiavimai, atlikti Lietuvos regionų pavyzdžiu, parodė, kad dabar vykdoma regioninė praktika yra neefektyvi, kadangi daugiausiai šalies nepaprastųjų lėšų skiriama labiausiai išsivysčiusiems regionams.