

Moreover, in comparison with the year 2000 their positions were not positively, significantly changed in the year 2005 and 2010 which indicates the persistence of regional disparities. In positive sense, regions as Střední Čechy, Jihozápad, Severovýchod, Közép-Dunántúl, Małopolskie, Wielkopolskie and Západné Slovensko kept their position in top twenty for most of evaluated period.

Table 6 Region's ranking by TOPSIS (2000, 2005, 2010)

Code	Region	2000		2005		2010	
		c_i	Rank	c_i	Rank	c_i	Rank
CZ01	Praha	0,893	1	0,950	1	0,946	1
CZ02	Střední Čechy	0,429	4	0,388	4	0,333	5
CZ03	Jihozápad	0,352	6	0,346	6	0,285	7
CZ04	Severozápad	0,265	11	0,240	13	0,197	16
CZ05	Severovýchod	0,340	7	0,310	8	0,260	8
CZ06	Jihovýchod	0,338	8	0,324	7	0,296	6
CZ07	Střední Morava	0,279	10	0,266	11	0,233	12
CZ08	Moravskoslezsko	0,249	13	0,272	9	0,241	9
HU10	Közép-Magyarország	0,489	3	0,540	3	0,499	3
HU21	Közép-Dunántúl	0,250	12	0,250	12	0,173	20
HU22	Nyugat-Dunántúl	0,307	9	0,267	10	0,222	15
HU23	Dél-Dunántúl	0,174	17	0,170	16	0,101	32
HU31	Észak-Magyarország	0,143	25	0,139	23	0,058	35
HU32	Észak-Alföld	0,149	23	0,160	19	0,103	31
HU33	Dél-Alföld	0,197	15	0,168	18	0,129	27
PL11	Łódzkie	0,147	24	0,129	24	0,187	18
PL12	Mazowieckie	0,409	5	0,362	5	0,469	4
PL21	Małopolskie	0,173	18	0,141	21	0,176	19
PL22	Śląskie	0,191	16	0,169	17	0,239	11
PL31	Lubelskie	0,122	28	0,101	30	0,124	28
PL32	Podkarpackie	0,115	30	0,078	32	0,099	33
PL33	Świętokrzyskie	0,097	33	0,074	33	0,111	30
PL34	Podlaskie	0,108	32	0,108	26	0,123	29
PL41	Wielkopolskie	0,207	14	0,174	15	0,228	13
PL42	Zachodniopomorskie	0,156	22	0,105	28	0,142	25
PL43	Lubuskie	0,109	31	0,106	27	0,145	23
PL51	Dolnośląskie	0,163	21	0,144	20	0,240	10
PL52	Opolskie	0,133	26	0,104	29	0,142	24
PL61	Kujawsko-Pomorskie	0,130	27	0,097	31	0,146	22
PL62	Warmińsko-Mazurskie	0,078	34	0,066	34	0,130	26
PL63	Pomorskie	0,166	20	0,139	22	0,197	17
SK01	Bratislavský kraj	0,688	2	0,791	2	0,861	2
SK02	Západné Slovensko	0,166	19	0,205	14	0,223	14
SK03	Stredné Slovensko	0,116	29	0,111	25	0,152	21
SK04	Východné Slovensko	0,053	35	0,065	35	0,078	34

Source: own calculation, 2013

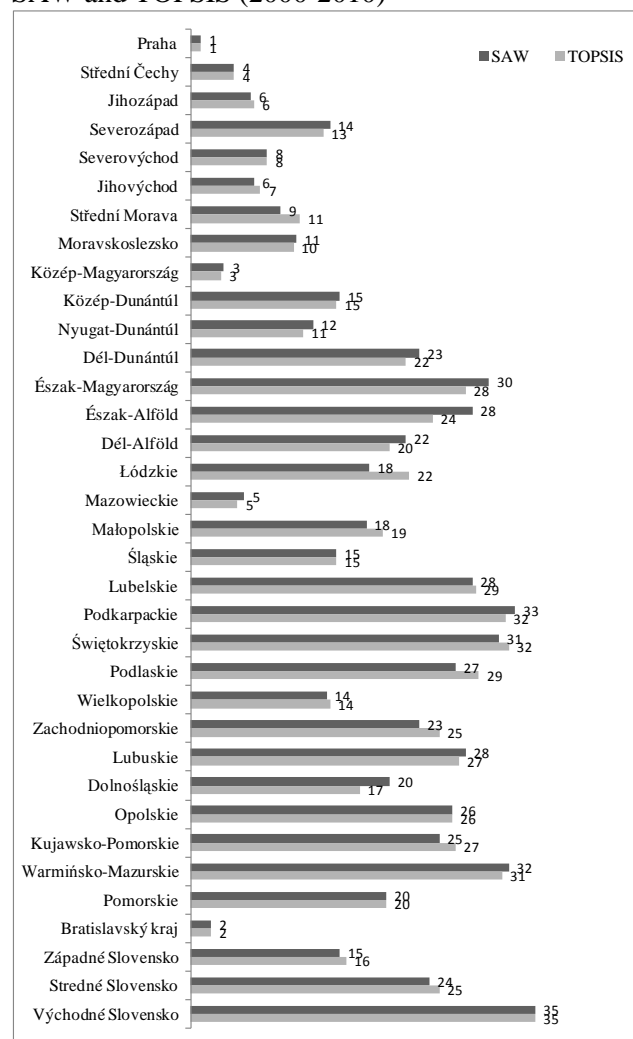
The results showed that SAW and TOPSIS have not an identical rankings of regions overall. We carry on the comparison between SAW and TOPSIS using average ranking for period 2000-2010.

In 37 %, SAW and TOPSIS have identical rankings. In 37 % SAW and TOPSIS have almost identical ranking, the rank of region is better or worse about one position. In 26 %, SAW and TOPSIS have different rankings (rank of region is better or worse about two to four positions).

Figure 1 shows identical average rankings according SAW and TOPSIS which have

particularly the regions of capital cities and Czech regions Střední Čechy. The average ranking of regions on the first five positions again confirmed the differences among metropolitan regions and the rest of V4 regions. SAW and TOPSIS methods also confirmed the worse position of least developed region Východné Slovensko. Different average ranking have regions Střední Morava, Észak-Magyarország, Észak-Alföld, Dél-Alföld, Łódzkie, Podlaskie, Zachodniopomorskie, Dolnośląskie, Kujawsko-Pomorskie. As can be seen in Figure 1, regions Észak-Magyarország, Észak-Alföld, Dél-Alföld, Dolnośląskie are ranked in better positions by TOPSIS. In comparison, Střední Morava, Łódzkie, Podlaskie Zachodniopomorskie, Kujawsko-Pomorskie are ranked in worse positions by TOPSIS.

Fig.1 Comparison of average region's ranking by SAW and TOPSIS (2000-2010)



Source: own calculation, 2013

According to socio-economic development we could divide the NUTS 2 regions into four groups.

First group includes regions of capital city Praha, Bratislavský kraj, Közép-Magyarország, Mazowieckie and Střední Čechy, as we stated above these regions are treated as the developed regions with strong economy. The second group of regions with average ranking from 6th to 14th position (Czech regions Jihozápad, Jihovýchod Severovýchod, Střední Morava, Severozápad, Moravskoslezsko, Hungarian region Nyugat-Dunántúl and Polish region Wielkopolskie) can be considered as regions rather converge to best regions and have development potential. The third group of regions from 15th to 30th average ranking (Hungarian regions Közép-Dunántúl, Dél-Alföld, Észak-Magyarország, Észak-Alföld, Dél-Dunántúl, Polish regions Małopolskie, Śląskie, Pomorskie, Dolnośląskie, Łódzkie, Zachodniopomorskie, Kujawsko-Pomorskie, Lubuskie, Lubelskie, Podlaskie, Opolskie and finally Slovak regions Západné Slovensko and Stredné Slovensko) represent the middle situation, regional disparities have rather moderate decrease and their economy is still not strong enough. Polish regions Podkarpackie, Świętokrzyskie, Warmińsko-Mazurskie and Slovak region Východné Slovensko can be considered as least developed group compared to others and they are ranked in last position.

5 Conclusion

In this paper, the problems of evaluation of regional development and disparities in Visegrad Four are considered. The states strive to achieve a higher level of development by eliminating the gap in economic, social and territorial development among their regions. The EU cohesion policy plays crucial role in funding regional development within EU member states. To ensure efficient allocation of investments, it is necessary to recognize the actual level of economic, social and territorial development of particular regions. The regional development can be characterized by various types of parameters (economic, social, and territorial). Therefore, multicriteria approach is used to evaluate the actual level of development of regions in complex way. Multicriteria decision-making methods are widely used, and there are many application proposed in the literature. The advantage of MCDM methods is that it can give its users many dimensions to consider related elements, and evaluate all possible options under variable degrees [6]

With regard to the absence of the mainstream in regional disparities evaluation, the purpose of this paper is to highlight an alternative ways of

quantitative evaluating of differences in the level of socio-economic development. The paper constructed a comparison of regions' ranking according to their socio-economic development based on selected MCDM methods. First, AHP was used to establish hierarchy architecture and then expressed individual weights of criteria by comparing pairs. After that, SAW and TOPSIS were utilized to make non-linear calculations in order to obtain final appraisal values and to rank the performance alternatives (regions). The paper discusses the regions' ranking according to particular group decision method and compares the ranking outcomes among SAW and TOPSIS.

The results showed that SAW and TOPSIS do not have identical rankings in some cases in examined period. Different ranking can be caused by own means of calculation of both methods that differ in advantages and disadvantages. SAW is simple technique based on the principle of utility maximization and benefits from additive property for calculating final score of alternatives. While TOPSIS represents an alternative that should have the shortest distance from the positive ideal solution and the farthest from the negative-ideal solution for solving a multiple-criteria decision-making problem. The advantage of SAW is that it is simple and easy to use and understand. SAW reflects main concept underlying quantitative multicriteria evaluation methods, consisting in integrating the criteria values and weights into a single magnitude – the criterion of the method [22]. TOPSIS considers positive and negative ideal solutions as anchor points to reflect the contrast of the currently achievable criterion performances [5]. Both methods assume that there exists a performance matrix obtained by the evaluation of all the alternatives in terms of criterion. In SAW method, all the values of the criteria should be maximizing. Minimizing criteria should be transformed to maximizing ones. Also before the execution of TOPSIS, procedure that converts all the criteria so that all of them were either minimization or maximization is implemented. Both methods assume to use normalization to eliminate the units of criterion values. The difference appears in the technique of normalization. SAW method uses linear normalization and calculated values are dependent on the size of the interval $\max_i x_{ij}; \min_i x_{ij}$. The TOPSIS method uses vector normalization and the ratio of the values remains constant for this type of normalization in the interval [0;1], [33]. Both methods are based on aggregating function that is used as a ranking index. The difference appears in the aggregation approaches. SAW assumes

preferential independence of criteria and adopt the simplification in that it assumes only linear utility function. TOPSIS method introduces the ranking index in Eq. (8), including the distances from the ideal point and from the negative-ideal point. These distances in TOPSIS are simply summed in Eq. (8), without considering their relative importance. However, the reference point could be a major concern in decision making, and to be as close as possible to the ideal is the rationale of human choice. Being far away from a negative point is goal in this particular situation [19]. Both methods provide a ranking list. The largest value of the utility $u_i(x)$ corresponds to the best alternative. The alternatives compared should be ranked in the decreasing order of the calculated values of the criterion $u_i(x)$. The highest ranked alternative by TOPSIS is the best in terms of the ranking index, which does not mean that it is always the closest to the ideal solution [22].

Although, the results of SAW and TOPSIS methods differs in some ranking of regions, the results of both methods confirm that NUTS 2 regions with capital cities (Praha, Bratislavský kraj, Mazowieckie, Közép- Magyarország) and Czech region Střední Čechy have had significant and different socio-economic position from the other regions in V4. The dominance of capital cities results from more intensive integration into the world economy, which is reflected in different structures in comparison with other regions. Capital cities are main administrative centres, where the great mass of public institutions and the private sector is concentrated (corporate headquarters, central administrative authorities, universities, etc.). On the other hand, it is necessary to take into account the statistical effect that can overvalue some indicators of economic performance. According to average ranking of both methods Polish regions Podkarpackie, Świętokrzyskie, Warmińsko-Mazurskie and Slovak region Východné Slovensko can be considered as the least developed. These regions should focus on higher expenditure on research and development which are major drivers of economic growth and it also supports future competitiveness that results in higher GDP. The public investments in infrastructure (transport, communication, and energy), spending on education active labour market, and effective utilization of subsidies from European funds, play key roles in developing these regions. Also highly developed regions can be the motivation for lagging regions to catch up with them. Due to diffusion effects, the support of economically successful capital cities and their competitiveness results later in higher

performance of whole state, including the lagging regions. Regional disparities can also play a motivation role.

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Annex

Table 1 Pairwise comparison matrix of subcriteria with respect to the goal

	Economic disparities	Social disparities	Territorial disparities
Economic disparities	1	5	7
Social disparities	1/5	1	3
Territorial disparities	1/7	1/3	1

Source: own elaboration

Table 2 Pairwise comparison matrix for criteria with respect to economic disparities

	GDP	DI	GERD
GDP	1	3	5
DI	1/3	1	3
GERD	1/5	1/3	1

Source: own elaboration

Table 3 Pairwise comparison matrix for criteria with respect to social disparities

	ER	UER	TE
ER	1	1/3	5
UER	3	1	7
TE	1/5	1/7	1

Source: own elaboration

Table 4 Pairwise comparison matrix for criteria with respect to territorial disparities

	IM	HB
IM	1	3
HB	1/3	1

Source: own elaboration