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STATE AND DEVELOPMENT ANALYSIS OF HUMAN RESOURCES IN CZECH REGION SOUTH-WEST

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Abstract

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Within determination of regional development strategies it is necessary to analyze the present development of all groups of indicators expressing the state and development of the region and especially to identify factors determining the region development, and to evaluate and quantify their significance. The state and development analyses of human resources in the region have the irreplaceable place here. Human resources are the determining resource of regional development; therefore it is necessary to give them appropriate attention because the further economic development and prosperity of the given territory depend just on them. The paper aim is to evaluate the state and development of human resources in a complex effect of all relevant factors in districts of the region South-West and on base of the analyses to set groups of districts with a similar development and to determine groups of districts or districts which can be marked from the given view-point as endangered. As the basic areas for the analysis the demographic indicators, an economic activity of inhabitants and unemployment of inhabitants were chosen. Besides the basic statistical dynamics indicators also multidimensional statistical methods were used for the analyses – a principal component analysis and a cluster analysis. By their help indicators were selected whose influence showed themselves as the strongest in the given period, and further they served for establishment of homogeneous groups of districts with a similar state of human factors. It enabled to characterize from the given point of view particular groups of districts and to reveal strong and weak places of human potential development in them.

regional development, districts, statistical analysis, principal component analysis, cluster analysis

Possibilities of regional development are conditioned by many aspects. There is a presentation of geographical influences (natural conditions, natural resources), of a settlement way, of a technical and social infrastructure etc. However, the main factor is development of human resources (Dufek, Minařík, 2009, 2010). Human resources represent the basic and determining factor of regional development (Jeníček, 2010). It is essential so that conditions for development of human resources were on such a level to be able to enable quality living standard of inhabitants in the given region (Wokoun, 2008). If the chosen aims of development strategies of particular region should be met, it is necessary to stem from qualified and detail analyses of the state and development of human factor in the given territory because these analyses bring information fundamental for further economic development and prosperity of the given area (Malečková *et al*., 2009; Šídlo, Tesárková, 2009; Tesárková, Šídlo, 2009). On base of proper knowledge of the human resources potential in the region it is possible to work out complex, realistic and really accessible development conception for the given territorial unit with regard to its needs, tradition and specifics.

MATERIAL AND METHODS

The analysis is focused on basic development tendencies of selected indicators characterizing

the state and development of human resources in districts of the region South-West with aim to define their position and a possible danger.

For these purposes, at first a comparison of development tendencies of selected indicators was carried out using simple statistical dynamics indicators; subsequently multidimensional methods were used by the help of which groups of districts with similar development tendencies were determined (Řehoř, 2011). Here, the cluster analysis and the principal component analysis were used.

The aim of the cluster analysis is to classify the given collection of units characterized by group of characteristics, into several relatively homogeneous groups (clusters) so that objects inside the clusters would be as much similar each to other as possible and units belonging in various clusters would be similar to each other as less as possible. A result of the analysis depends on a choice of variables, the chosen rate of distance among objects and clusters, and on the chosen calculation algorithm. Regarding the data character and the requirement to create clusters of roughly the same size, Ward method (Hebák, 2004) was chosen expressed from a matrix of Euclidean distances.

The principal component analysis, on base of processing of a multidimensional collection, enables to carry out a reduction of variables and to determine indicators which have a crucial influence; and at the same time it defines an influence strength of given indicators on the resulting effects (Hebák, 2004; Hendl, 2004). On base of results of the principal component analysis, an evaluation of districts position was carried out from a view-point of selected relevant indicators characterizing the state and development of human resources.

The analysis of state and development of human resources concentrated on 3 basic spheres of observing:

- Demographic development
- Economic activity of population
- Unemployment of population.

The indicators selection was realized with regard to accessibility of data so that it would be possible to carry out routinely the monitoring and evaluation of level and development tendencies of the indicators in the regions. It is dealt with data published by the Czech Statistic Office (CSO) and the Ministry of Labour and Social Affairs over the years 2000–2009.

RESULTS AND DISCUSSION

Demographical development of inhabitants

The region South-West includes two regions – South-Bohemian and Pilsen. In their area, both regions belong to the biggest ones, however, in the inhabitant density they are ranked in regions with the lowest inhabitant density. While the average inhabitant density in the CR amounts to 133 inhabitants per 1 km^2; in the South-Bohemian region there are 63 inhabitants per 1 km^2 which represents the minimum in the CR; and in the Pilsen region then 75 inhabitants per 1 km^2. There are also huge differences among particular districts. In the South-Bohemian region, there is the highest density of inhabitants in the region České Budějovice (113), the lowest then in the region Český Krumlov (38) and Prachatice (37). In the region Pilsen, the highest density of inhabitants is in the district Pilsen-město (708), then the lowest in the district Tachov (39).

A specific of both the regions is a relatively high share of small municipalities and a small share of bigger towns. The table I shows a comparison of a size structure of municipalities of both the regions with the entire CR.

A movement of inhabitants is characterized by means of indicators – the number of born per 1 000 inhabitants, the natural increase per 1 000 inhabitants, and the total increase per 1 000 inhabitants. The number of born, similarly as in the entire CR, significantly grew since 2006 which is connected with the strong population from 1970'. This increase has last till 2008; in recent years the number of born has decreased. The regions South-Bohemia and Pilsen can be evaluated from a view-point of CR regions as slightly below-average.

With the growing number of born, also values of natural increase, which is expressed as the number of born minus the number of died, correspond. Since 2005 it was negative practically in all CR regions; since 2006 it has had more strongly growing tendency and it has reached positive values practically in all regions. Similarly as in the number

I: *Size structure of CR municipalities in South-Bohemian and Pilsen region in 2009*

Size group – number of inhabitants in municipality	Share in total number of inhabitants in given area – %		
	CR	South-Bohemian region	Pilsen region
–199	24.69	38.20	36.93
200–499	31.72	32.26	30.33
500–999	21.54	13.48	15.37
1 000–4 999	17.67	13.00	14.57
5 000–19 999	3.37	2.25	2.39
20 000–49 999	0.67	0.64	0.20
50 000–99 999	0.24	0.16	0

of born, the regions South-Bohemian and Pilsen can be evaluated as slightly below-average.

The total increase in population includes besides the born and the died also a migration of population (immigrants minus emigrants) and its values testify also to „attractiveness" of the given area and they can differ very much from values of the natural increase. The total increase recorded a high increment in all regions in 2006–2008. A very significant increase in this period is in Prague, Central-Bohemia and Pilsen region. Since 2008, a decrease has happened in all regions. During the monitored period, any significant changes appeared in South-Bohemian region; both the increase and decrease were gradual.

There are obvious certain differences in particular districts of evaluated regions. The most significant differences are in the total increase in which a migration plays an important role. In South-Bohemian region, demographic development can be favourably evaluated in the district Český Krumlov where the natural increase is positive throughout the whole period and the number of born per 1 000 inhabitants is here the highest of the whole region. The total increase in 2009 is the highest in this region in the district České Budějovice, caused mainly by a higher positive migration balance which is obviously connected with a higher offer of jobs in the county town.

The highest natural increase in the region Pilsen belongs to the district Tachov which has, however, also a negative total increase throughout the whole period. Vice versa, a high total increase caused mainly by migration is shown by districts Pilsen-south, Pilsen-north and Domažlice. A higher natural increase is in the districts Domažlice and Pilsen-town.

For monitoring which factors participated the most in the demographic development in the district, the principal component analysis was used which considered data over the year 2009. On base of results of the principal component analysis, variables were defined whose influence was the strongest in the given period. In a model for South-Bohemian and Pilsen regions, the total dispersion was explained from 94% by the help of three components with following shares and determining variables:

1. component – explains 61% of the total dispersion with determining variables – the natural increase, the average age, the age index, and the share of productive population;
2. component – explains 22% of the total dispersion with the determining variable – the total increase;
3. component – it explains 11% of the total dispersion with determining variable – the number of born per 1 000 inhabitants.

From the mentioned it is evident that the age structure and population aging enforce the most significantly in both regions.

By means of the cluster analysis, groups of districts with a similar development were created then.

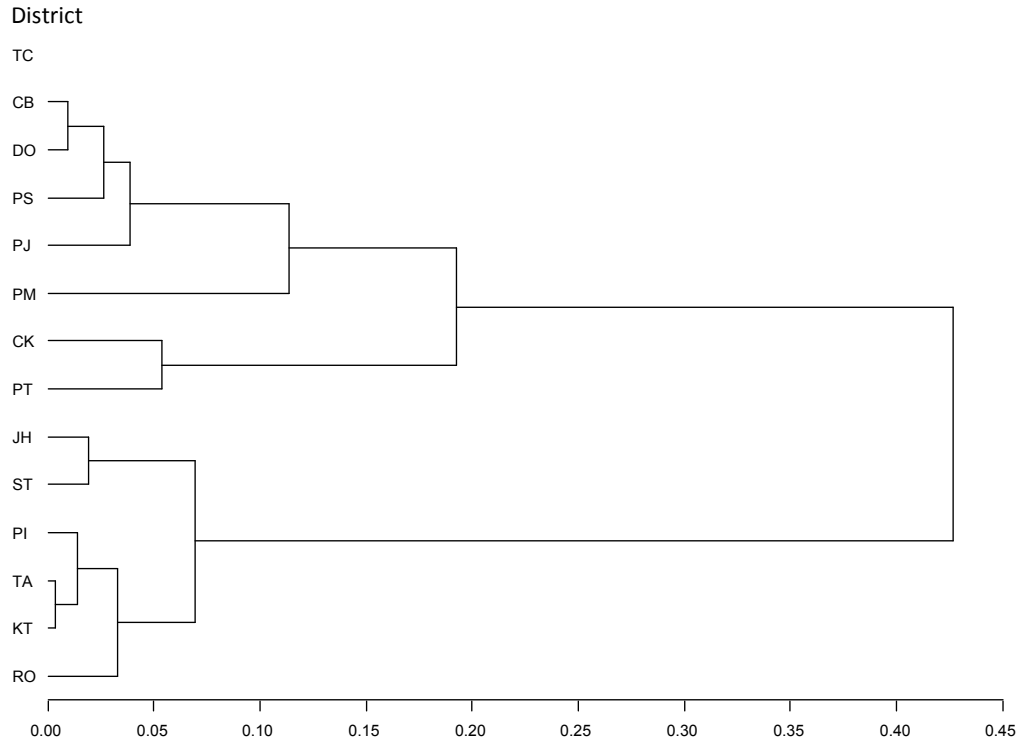
In the model for the districts of South-Bohemian and Pilsen, five groups can be formed:

1. District Tachov (TC),
2. District České Budějovice (CB), Domažlice (DO), Pilsen-north (PS), Pilsen-south (PJ),
3. District Pilsen-town (PM),

II: *Indicators of population movement in districts of South-Bohemian and Pilsen regions in 2000 and 2009*

Area	Number of born per 1 000 inhabitants		Natural increase per 1 000 inhabitants		Total increase per 1 000 inhabitants	
	2000	2009	2000	2009	2000	2009
CR	8.8	11.3	–1,8	1.0	**–1.1**	3.7
South-Bohemian region	9.0	11.0	–1,2	0.9	**–0.4**	2.1
České Budějovice	9.2	11.1	–0.4	1.4	1.3	5.9
Český Krumlov	9.8	12.6	1.3	2.9	0.4	1.9
Jindřichův Hradec	9.2	10.5	–1.8	–0.1	–2.0	–0.4
Písek	8.7	10.3	–2.2	–0.6	–1.8	0.6
Prachatice	9.2	11.2	–0.4	2.2	0.5	0.1
Strakonice	8.4	10.8	–2.5	0.1	–2.4	–2.1
Tábor	8.7	10.7	–2.1	0.6	–0.4	2.3
Pilsen region	8.9	11.2	**–2.0**	1,1	**–1.1**	3.9
Domažlice	10.0	11.7	–0.3	1.8	1.2	5.9
Klatovy	8.7	10.6	–3.1	0.1	–2.4	0.6
Pilsen-town	8.2	11.8	–2.5	1.7	–3.7	3,9
Pilsen-north	8.8	11.6	–2.7	0.9	4.8	9.1
Pilsen-south	9.0	10.6	–1.9	0.3	1.0	9.3
Rokycany	9.2	10.0	–2.4	–1.4	–1.3	0.4
Tachov	9.8	11.1	1.0	2.1	–0.9	–3.2

Source: CSO



1: *Results of cluster analysis for model of districts of South-Bohemian and Pilsen regions – 2009*

4. Districts Český Krumlov (CK), Prachatice (PT),
5. Districts Jindřichův Hradec (JH), Písek (PI), Strakonice (ST), Tábor (TA), Klatovy (KT), Rokycany (RO).

The districts Tachov is characteristic with a high natural increase, a low average age, a low age index and a high share of productive population, however, at the same tome with the highest negative total increase – so, the population outflow from the district.

The districts in the second group have a positive natural increase and a high positive total increase; the average age is about 40 years and the age index can be evaluated also as favourable, same as the share of productive population.

The district Pilsen-town has a medium total increase, but unfavourable age structure of population. There are a high average age and a very high age index which is usually typical for large city.

The districts Český Krumlov and Prachatice are districts with the highest natural increase, the low average age and the age index, and the highest share of productive population. However, they have a very low (though positive) total increase.

The fifth group districts are characteristic with a very low or even negative natural and total increase, a high average age and the age index, and a low share of productive population.

Economic activity of population

A rate of economic activity in the CR has values slightly below 60% throughout the whole period. The region Pilsen belongs to regions with the highest rate, South-Bohemian region is slightly below the CR average. By reason of economic non-activity, the highest rate is made by old-age and disability pensions (more than 60%) and a study at all types of schools. Here, the rate does not differ much from the nationwide average. The difference is in a parental leave where a share of in such way economically non-active is higher in both the regions than the CR average; and further health reasons where the rate of economically non-active is significantly lower.

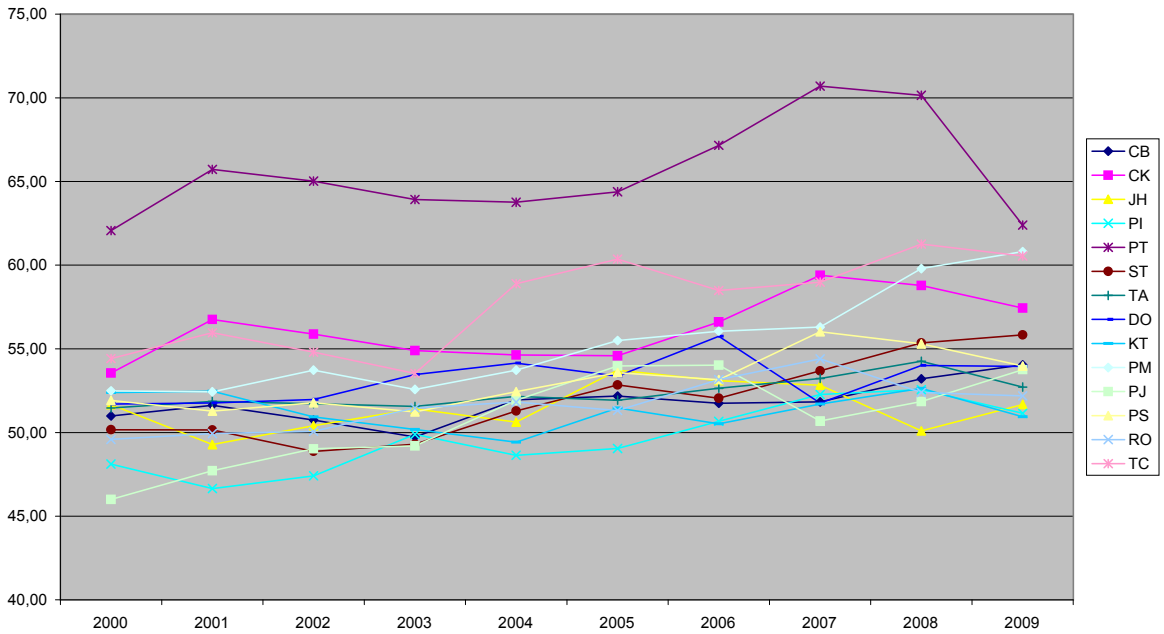
If we compare the rate of economic activity in particular districts of the region South-West, there are obvious differences both in the development tendencies and the values themselves.

The highest values (more than 60%) can be recorded in 2009 in the districts Pilsen-town (PM), Prachatice (PT) and Tachov (TC). Vice versa, very low values (up to 53%) are shown in 2009 by districts Jindřichův Hradec (JH), Písek (PI), Tábor (TA), Klatovy (KT) and Rokycany (RO).

The cluster analysis used for development tendencies in the district enabled a rise of four groups which can be characterized in the following way:

1. Prachatice – the economic activity rate very high throughout the whole period, a relatively favourable development;
2. Český Krumlov, Pilsen-town, Tachov – values close to average, an increasing tendency;
3. České Budějovice, Tábor, Pilsen-north, Rokycany, Strakonice, Klatovy, Domažlice – values below the average, a slightly increasing tendency;

Development of economic activity rate in districts of Sought-Bohemia and Pilsen region (2000–2009)



2: *Development of economic activity rate in districts of South-Bohemian and Pilsen regions in 2000–2009*
Source: CSO

4. Jindřichův Hradec, Písek, Pilsen-south – low values, more significantly below the average.

Unemployment

The unemployment rate had developed favourably till 2007 when it was possible to record its decrease practically in all regions. In 2008, a slight increase happens; in 2009, the increase is already very significant in all regions. Main tendencies, i.e. decrease in the unemployment rate till 2007 and its subsequent increase, are practically the same in all regions. However, they differ in their absolute size and the growth rate or decrease rate size.

Traditionally, the lowest unemployment rate is in the city Prague where it amounts to 2.3 % in 2004 and 3.66 % in 2009. In other regions, the unemployment

III: *Development of registered unemployment rate in districts of South-Bohemian and Pilsen regions in 2005–2009*

	2005	2006	2007	2008	2009
CR	7.9	7,1	5,3	4,4	6,7
South-Bohemian region	6.7	5,7	4,4	4,8	7,8
District České Budějovice	4.55	4.00	3.38	3.62	5.85
District Český Krumlov	10.13	8.21	6.19	6.78	10.19
District Jindřichův Hradec	7.45	5.96	4.53	4.56	8.26
District Písek	8.49	6.86	5.08	5.26	8.01
District Prachatice	6.40	5.22	3.97	4.75	7.00
District Strakonice	7.34	6.65	5.31	5.82	8.46
District Tábor	6.17	5.52	4.45	4.98	9.12
Pilsen region	6.45	5.60	4.43	5.03	8.16
District Domažlice	6.45	5.15	4.62	5.58	9.61
District Klatovy	8.60	7.74	6.22	6.31	9.51
District Pilsen-town	5.45	4.79	3.64	3.63	6.14
District Pilsen-south	4.75	3.93	3.27	3.47	6.83
District Pilsen-north	5.88	5.21	4.00	4.72	7.79
District Rokycany	6.78	5.46	3.82	5.04	8.51
District Tachov	8.62	7.95	6.42	9.25	13.43

Source: CSO

rate is always higher, whereas the second region in order has the rate double against Prague. In 2004, the unemployment rate exceeds 10% in five regions; in 2009, the border of 10% was exceeded in eight regions.

South-Bohemian and Pilsen regions belonged to regions with a lower unemployment than the CR average throughout the whole period; in the last year of monitoring, the values of unemployment rate significantly increased in both regions, however, despite the fact they are still below the CR average. If we compose the order of regions from a view-point of size of the unemployment rate, than both the regions are in the first half of order.

Provided monitoring of the unemployment rate in districts of the region South-West, development tendencies are similar to tendencies in the entire Czech Republic; it means that by 2077, there is a decrease, than an increase in size of the unemployment rate follows since this year with a higher increase in 2009. However, the size of unemployment rate differs very significantly in particular districts.

The lowest unemployment rate is showed by the districts České Budějovice and Pilsen – town, so the districts with county towns; significantly the highest rate is recorded in the districts Český Krumlov and Tachov. In the district Tachov, a very significant increase has happened already since 2007.

By the help of the cluster analysis, from a view-point of the size and development of registered unemployment rate, three groups with following characteristics were created:

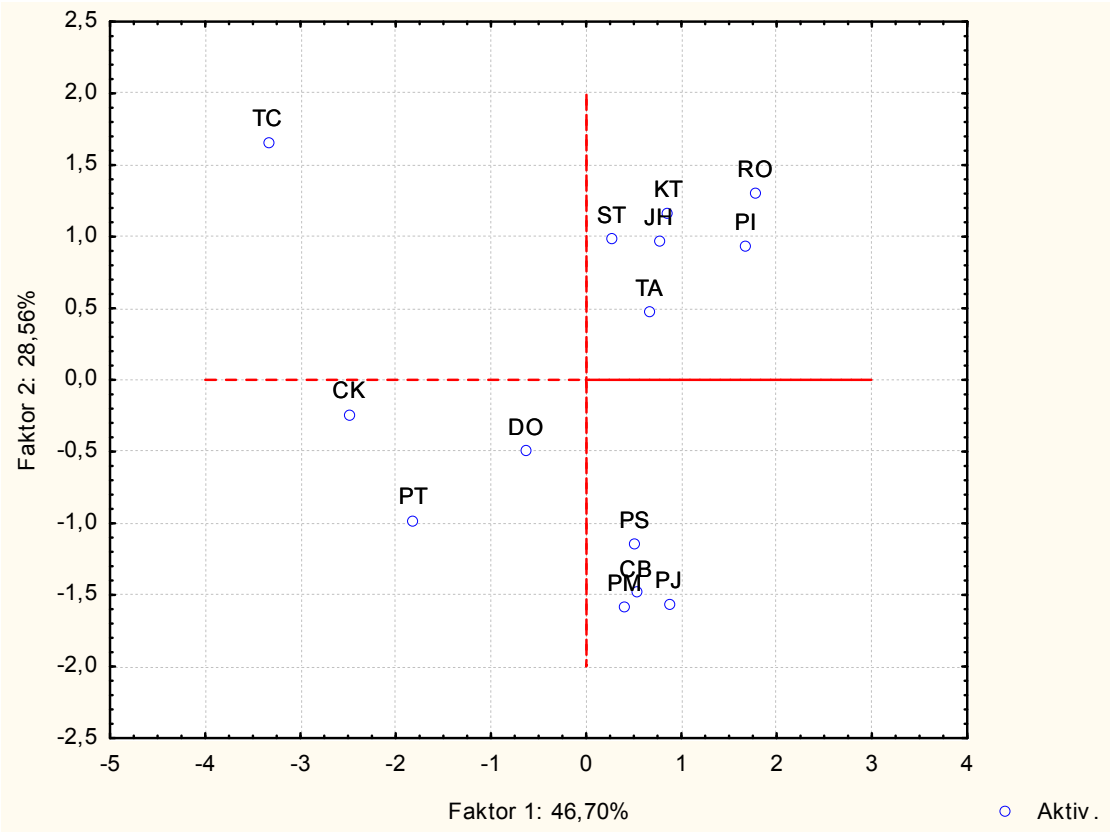
České Budějovice, Pilsen-south and Pilsen-town – districts with a county town or within easy reach where there are better work opportunities. The unemployment rate is the lowest here in regions throughout the whole period.

Jindřichův Hradec, Písek, Strakonice, Prachatice, Pilsen-north, Rokycany, Tábor, Domažlice – the unemployment rate is average or slightly above the average.

Český Krumlov, Klatovy, Tachov – districts endangered where the unemployment rate is very high throughout the entire period.

CONCLUSION

In the final evaluation stage, the principal component analysis was used aim of which was to determine the current position of districts from a view-point of the whole examined problem. For monitoring of human resources state in districts of South-Bohemian and Pilsen region, with regard to accessible data, a model was used which includes five fundamental indicators: the natural increase, the total increase, the age index, the economic activity rate, and the unemployment rate with following results:



3: *Distribution of districts of South-Bohemian and Pilsen regions from view-point of human resources state*

Subsequently, particular groups of districts can be characterized from the given point of view:

1. group – districts Pilsen-town, Pilsen-north, Pilsen-south, České Budějovice – county towns and districts near to the county town, a low unemployment rate, higher the total increase, a positive natural increase, a higher value of age index (above 100).
2. group – districts Klatovy, Rokycany, Strakonice, Jindřichův Hradec, Písek, Tábor – negative or very low positive values of natural increase, a low or even negative (JH, ST) total increase, a higher age index, a lower economically active rate, the unemploymentrate slightly above average.
3. group – districts Český Krumlov, Prachatice, Domažlice – a positive natural increase, positive the total increase, lowe values of the age index, the unemployment rate obve the regions' value.
4. group – district Tachov – the high unemployment rate, a positive natural increase, but the highest total increase.

From the position of particular districts as favourable the state of human resources can be appraised. In other groups, some negative phenomena occur always. A disconcerting is the negative total increase which occurs in many districts. These districts are not attractive for inhabitants for various reasons (especially for reasons of worse work opportunities) and if the situation does not change here, a gradual depopulation of the given area could happen. This situation manifests itself the most depressingly in the district Tachov.

SUMMARY

The paper aim was to evaluate the differentiation of state and development of human resources in districts of the region South-West. The analysis concentrated on three basic spheres – the demographic state and development, the economic activity of population and the population unemployment. In the first stage, basic characteristics enabling to evaluate the state and dynamics of particular indicators were used; in the second stage, multidimensional statistical analyses were used by means of which it was possible to state and development of human resources can be evaluated in the complex effect of all relevant factors in districts of the region South-West. By the help of the principal component analysis, at first relevant indicators were selected influence of which manifests itself as the strongest. Further, together with the cluster analysis it was used to define homogeneous groups of districts with a similar state, both from the view-point of particular investigated spheres and the complex view-point. It facilitated to determine the current position of districts from the view-point of the all examined problems, and to define districts with a perspective development, and districts problematic from the given point of view.

Generally, the districts of region South-West can be evaluated from the demographic point of view as slightly below-average, from the view-point of economic activity the region Pilsen belongs to regions with the highest economic activity rate; the region South-Bohemian is slightly below the CR average. Regarding the unemployment, both the regions are below the CR average. However, the situation in particular districts of these regions is very differentiated. If we stem from results of analyses of the total position of particular districts in the region, then as districts with favourable development the county towns and districts near to the county towns appear (Pilsen-town, Pilsen-north, Pilsen-south, České Budějovice), though as negative the factor of population aging can be indicated here. In other groups, always some more significant negative phenomena occur. For the group of districts Klatovy, Rokycany, Strakonice, Jindřichův Hradec, Písek and Tábor, very low or even negative values of natural and the total increase in population and a higher share of inhabitant older above 65 years are warning. In the districts Český Krumlov, Prachatice and Domažlice a favourable demographic development was found out, however, also a higher unemployment rate which could lead, if there is the same situation on the labour market, to a population outflow. Incidentally, it has already manifests itself in the district Tachov where there is a high unemployment rate and at the same time the highest negative total increase. Unambiguously, this district can be marked from the given aspect as endangered.

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