

Regional differentiations of rural villages in the Czech Republic

Regionální diference venkovských obcí v České republice

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Abstract: Rural villages are the sole subjects in rural area which integrate all elements acting in the rural area to one functional whole. They can be therefore taken as the pivotal element of rural development. The research was done in 2004 and was based on the search for rural villages' characteristics and exploration of the elements of regional differentiation. The project results from the presumption of difference between the rural villages given by their size, location in specific areas or on exposed roads, distance from civic centers etc. It is supposed that these characteristics have specific and significant connections with such phenomenon as the level of unemployment, the level of civic and technical facilities in villages, the activity of inhabitants and the village itself, etc. The challenge was to define problem characteristics of rural areas, which mirror significant regional differences, structure and interconnectedness of these differences and their importance for future regional development. Interdependence of particular indicators was explored by statistical evaluation.

Key words: rural villages, rural area, regional differentiations, differentiation criteria, set of villages

Abstrakt: Venkovské obce jsou jediné subjekty ve venkovském prostoru, které integrují všechny prvky, které v něm působí, do jednoho funkčního celku. Lze je tedy brát jako klíčový prvek pro rozvoj venkova. Výzkum, který proběhl v roce 2004, spočívá v postihu charakteristik venkovských obcí a nalezení prvků jejich regionální diference. Projekt vychází z předpokladu, že mezi venkovskými obcemi existují rozdíly dané velikostí obce, jejich polohou ve specifické oblasti nebo na exponovaných komunikacích, vzdáleností od administrativních center apod. Zároveň se předpokládá, že tyto charakteristiky mají konkrétní významné souvislosti s takovými jevy jako je výše lokální nezaměstnanosti, občanská a technická vybavenost obcí, stav a aktivita obyvatel, aktivita obce atd. Úkolem bylo vytipovat a definovat problémové charakteristiky venkova, které zakládají zásadní regionální rozdíly, v jakých vazbách a souvislostech se tyto rozdíly projevují a jaký mají význam pro další rozvoj regionů. Základem pro zjištění vzájemné závislosti jednotlivých ukazatelů bylo statistické vyhodnocování.

Klíčová slova: venkovské obce, venkovský prostor, regionální diference, diferenační kritérium, soubor obcí

The development of agrarian sector and rural areas is substantially complex because it is influenced by both internal factors of economic and social changes in the society and external factors like in particular adaptation to the EU environment. Nevertheless, it represents an area of high importance in terms of foodstuff production, area settlements, cultural view of landscape, carrier of cultural heritage etc. The main developmental change consists in the fact that the previous function of agriculture, the foodstuff production, gives way to the multifunctional role which begins to dominate.

The former agricultural and rural structures, orientated on production and lifestyle connected with agriculture, have lost their function. They have become extinct or live on as traditions and folklore. A similar change can be seen also in both economics of agricultural enterprise and economical fighting power of villages. The original stimulation of volume of agricultural production has been changed to stimulation of its decrement.

Economic problems of farmers based on nature-climatic conditions and the situation in the agrarian commodities market are solved, to a large extent, by

Supported by the Ministry of Agriculture of the Czech Republic (Grant No. QF 3001).

agricultural subsidies and supports. Both national resources and support resources coming from the EU structural funds are drawn to agriculture after the EU entry. Therefore, it can be expected that new conditions to make agricultural enterprise more profitable will be created. On the other hand, the problems of rural villages have to be solved mostly by the villages themselves. Subsidies, accessible for them, prefer long term investments (e.g. technical infrastructure, monument preservation etc.) and do not resolve the urgent socioeconomic problems. There is the risk that this would lead to suitable conditions for agricultural enterprise on one hand but unsatisfactory conditions for living in rural areas on the other.

The question of rural villages' perspectives is actual not in the Czech Republic only but the attention increases in the EU as well. It is visible especially from current measures adopted within the CAP. As the CAP sets off a part of resources just for rural development, it is likely that in the future agriculture will not be an independent and relatively closed system separated from rural villages and they both will be integrated into one organic unit.

While there are many information systems concerning problems of agricultural enterprise, the information base of rural villages problems remains limited mainly to demographic characteristics that do not concern internal problems of rural villages. Different natural conditions, character, rapidness and extent of the transformation process in agriculture and industry, which translate into a considerable regional variability, are not covered at all (Vávra 2004).

The goal of the research that has been done in 2004 was to overcome the current lack of information and propose the methodology of evaluation of regional differentiation. This methodology results from the evaluation of various factors coming from differently extent sets of rural village's characteristics.

The challenge was to define rural areas problem characteristics, which translate into significant regional differences, structure and interconnectedness of these differences and their importance for future regional development.

RESEARCH OBJECTIVES

The research stems from the presumption of the difference between the rural villages given by their size, location in specific areas or on exposed parkways, distance from civic centers, etc. It is supposed that these characteristics have specific and significant connections with such phenomenon as the level of unemployment, level of civic and technical facilities in

villages, activity of inhabitants, village itself, etc. Finding of the hypothetical connectednesses can become the base for determination of differentiation criteria.

The objective is to define the instruments and indicators for the identification and classification of the most important types of regions in terms of regional differentiation in agrarian sector and rural development.

METHODOLOGY PROCESS

The methodological approach to the research comprised following steps. The first step involved the analysis of current situation of Czech rural areas both from the regional point of view and in comparison with the Czech Republic as a whole. For this purpose, the relevant data base, that provided the specification of the most important types of regions, was identified. The methodology procedures for processing of the conceptual measures of agrarian policy and rural development on a regional level stemmed from the previous steps.

The methodological process was focused on highly objective methods. These methods were based on the statistical evaluation of data with a particular focus on the data that brought new information about the interdependence and showed a high level of statistical significance.

The methodology process comprised three concurring steps:

1. Characteristics of Czech rural areas.
2. Modification of primary information – conversion of primary, mainly qualitative, information into the quantitative form.
3. Statistical evaluation of the obtained data.
 - 3.1 Ratio analysis provides an initial look at the interdependence of particular indicators. On the basis of consistent results, the analysis discovers duplicate indicators that will be excluded from following explorations.
 - 3.2 Factor analysis reduces an initial set of indicators into the group of dominant indicators.
 - 3.3 Regression analysis quantifies changes evoked by modifications of independent variables.
 - 3.4 Canonical correlations enable to evaluate connections between groups of indicators.

CHARACTERISTICS OF CZECH RURAL AREAS

Slepicka was one of the first authors who tried to formulate a definition of rural area in the Bohemian

environment. He defined the conception of rural areas or rural space as “rural settlement and open landscape”. By area, the rural space is usually specified as the complex of agricultural land, forests, water areas, urban areas, rural places, field paths and highways. The rural space conceived in this manner covers generally 70–90% of the territory of European countries (Slepicka 1981). The author uses the definition by summation; it means he defines rural areas as a complex of built-up and un-built territories except of towns.

A similar definition was used by Perlín who defines the village as a built-up area with typical rural structure. Countryside is then composed by both built-up areas and cultural landscape surrounding the village (Perlín 1998).

It is important to mention one of the later modern definitions of rural seat introduced in the Dictionary of Human Geography. The Dictionary defines, in the forth publication, the term “rural” as territory with dominant extensive land use, agriculture and forestry as well as wide undeveloped areas. On the other side, according to the Dictionary closer connection between inhabitants and landscape as well

as respect to environment is characteristic for rural areas.

The statistical limit, commonly used in the Czech Republic for determination of rural villages, is 2 000 inhabitants. In the conditions of the Czech Republic, villages with the number of inhabitants lower than 2 000 are considered rural.

There are 5 612 villages in the Czech Republic that are considered rural, this means 89.82% of all Czech villages. These villages administrate 73.6% of the total area of the Czech Republic but only 26.3% of the inhabitants live in these villages. It represents 2 690 thousand inhabitants by 1st January 2005.

For the determination of regions, the European Union applies the OECD methodology that classifies rural areas by population density.

According to this typology, three types of rural regions on the NUTS 3 level are identified:

- Predominantly rural regions – more than 50% of the population live in rural areas (for this purpose defined as areas with a population density of less than 150 persons per km²).
- Significantly rural regions – between 15–50% of the population live in rural areas.

Table 1. Classification of regions

Region (NUTS 3)	Number of inhabitants by 1. 1. 2005		Share of inhabitants by 1. 1. 2005 (%)		Type of region according to the OECD methodology
	in the region (NUTS 3) total	in villages with population density < 150 inhab./km ²	in villages with population density < 150 inhab./km ²	in villages with population density > 150 inhab./km ²	
Praha	1 170 571	0	0.0	100.0	predominantly urban
Středočeský	1 144 071	457 560	40.0	60.0	significantly rural
Jihočeský	625 712	292 876	46.8	53.2	significantly rural
Plzeňský	549 618	212 643	38.7	61.3	significantly rural
Karlovarský	304 588	84 375	27.7	72.3	significantly rural
Ústecký	822 133	193 287	23.5	76.5	significantly rural
Liberecký	427 563	126 425	29.6	70.4	significantly rural
Královehradecký	547 296	183 943	33.6	66.4	significantly rural
Pardubický	505 285	199 561	39.5	60.5	significantly rural
Vysočina	510 114	264 915	51.9	48.1	predominantly rural
Jihomoravský	1 130 240	371 776	32.9	67.1	significantly rural
Olomoucký	639 423	235 437	36.8	63.2	significantly rural
Zlínský	590 706	216 316	36.6	63.4	significantly rural
Moravskoslezský	1 253 257	221 634	17.7	82.3	significantly rural
Czech Republic	10 220 577	3 060 748	29.9	70.1	significantly rural

Source: National Strategic Rural Development Plan of the Czech Republic 2007–2013 (2005)

– Predominantly urban regions – less than 15% of the population live in rural areas.

For the Czech Republic this means that the capital of the Czech Republic comes under the category “predominantly urban regions”, the region Vysočina comes under the category “predominantly rural regions” and all other regions (NUTS 3 level) represent the category “significantly rural regions” (Table 1).

Administrative zoning

In terms of the administrative statute by 1st January 2005 the Czech Republic comprehends in total 5 716 villages with municipal offices, 527 towns (municipalities with municipal offices or town councils) and 5 military units (in total 6 248 municipalities at 1st January 2005). Towns represent the municipalities where the town municipal office was situated before 1990 and the municipalities that acquired this statute after 1990. According to the current law of municipalities, it is not possible to assign the stat-

ute of town to the municipality with less than 3 000 inhabitants. However, the earlier assigned privileges have not forfeited their validity, so currently there are 137 towns with less than 3 000 inhabitants including 54 towns with less than 2 000 inhabitants and 3 towns with less than 1 000 inhabitants in the Czech Republic (Table 2).

DATA ANALYSIS

The research has been done in 2004 and was based on search for rural villages’ characteristics and exploration of the elements of regional differentiation. For this purpose, data were obtained from the set provided by the Sociological Laboratory of Department of Humanities of the Czech University of Agriculture in Prague. This set included 1 311 randomly selected rural villages from all regions in the Czech Republic. For the purpose of this research, rural villages were characterized as villages with up to 2 000 inhabitants. The set was statistically representative for the whole territory of the Czech Republic.

Table 2. Settlement structure by size categories at January 1, 2005

Size category	Number of villages		Area in km ²		Number of inhabitants	
	abs.	%	abs.	%	abs.	%
to 199	1 633	26.14	9 702	12.30	200 534	1.96
200–499	2 012	32.20	18 296	23.20	653 740	6.40
500–999	1 293	20.69	17 021	21.58	901 546	8.82
1 000–1 499	449	7.19	8 244	10.45	545 888	5.34
1 500–1 999	225	3.60	4 765	6.04	387 968	3.80
“Villages” total	5 612	89.82	58 027	73.57	2 689 676	26.32
2 000–4 999	368	5.89	9 644	12.23	1 122 262	10.98
5 000–9 999	137	2.19	4 419	5.60	932 726	9.13
10 000–19 999	68	1.09	2 376	3.01	955 227	9.35
20 000–49 999	42	0.67	2 077	2.63	1 250 363	12.23
50 000–99 999	16	0.26	1 144	1.45	1 157 242	11.32
> 100 000	4	0.06	686	0.87	942 510	9.22
Prague	1	0.02	496	0.63	1 170 571	11.45
“Towns” total	636	10.18	20 841	26.42	7 530 901	73.68
CR total	6 248	100.00	78 869	100.00	10 220 576	100.00
Of this: towns	527	8.43	18 905	23.97	7 174 756	70.20
Other municipalities	5 721	91.57	59 964	76.03	3 045 821	29.80

Source: National Strategic Rural Development Plan of the Czech Republic 2007–2013, data by spatial delimitation by 1st January 2005

Statistical evaluation was enabled by the transformation of the predominantly qualitative primary data into the quantitative form.

Calculation of pair correlation provides the initial look at interdependence of the particular indicators. This method gives look at the level of mutual relations between all indicators. Regarding the high number of partial aspects, the method is acceptable only for the partial evaluation or comparison. Therefore, the overall evaluation is not provided.

Factor analysis was applied to quantify the minimal number of factors needed to explain the interdependence. The level of 80% reproduced variability of the set was represented by 18 factors (e.g. density of population per km², number of inhabitants, technical facilities, budget income per 1 inhabitant, etc.) comprised of 47 indicators characterizing the set of 1 311 villages from all the Czech Republic.

The next step consisted in the calculation of orthogonal factor rotation – varimax. This calculation provided a good interpretation of factors and offered

a picture of distribution of indicators in factors. It enabled to determinate the weight of factors as well.

Only the first factor is specified by three indicators, in other factors just one indicator is dominating. This important finding means that interdependent factors (and therefore dominant indicators as well) lie in the relative orthogonal position and therefore they are not interdependent. The weighted coefficient of each factor is equal or close to one. This means that the factors do not differ in weight. The dominant indicators make up four significant blocks:

- situation of inhabitants – number of inhabitants, population density, number of commuting inhabitants, number of village parts
- village activity (activity of the mayor or the municipal council) – budget income, utilization of subsidies from state budget, utilization of consulting services, development centers for enterprise, membership of the village in an association of villages, number of public meetings of the municipal council, participation on these meetings, the agreement to merge

Table 3. Linear regression of pair relationships – number of valid observations: 1 311

Independent variable	Dependent variable	Significance		Correlation coefficient	Multiple regression coefficient
		total	regression coefficient		
Number of village inhabitants	Civic facilities (basic school, shop, restaurant)	0.0000	0.0000	0.6549	0.00124
	Technical facilities (water supply, sewerage, gas)	0.0000	0.0000	0.5106	0.00103
	Development centers for enterprise and agriculture	0.4882	0.0761	0.0490	-0.00008
	Agreement with merge to another village	0.4453	0.0009	0.0913	-0.00017
	Village budget income per 1 inhabitant	0.4522	0.0019	0.0858	2.30895
Village size category	Civic facilities (primary school, shop, restaurant)	0.0000	0.0000	0.6865	0.5066
	Technical facilities (water supply, sewage, gas)	0.0000	0.0000	0.4978	0.3908
	Development centers for enterprise and agriculture	0.4846	0.0514	0.0538	-0.0330
	Agreement to merge with another village	0.4605	0.0043	0.0789	-0.0576
	No. of young people leaving the village	0.4799	0.0311	0.0596	0.0277
Population density (per km ²)	Civic facilities (primary school, shop, restaurant)	0.0088	0.0000	0.3518	0.0054
	Technical facilities (water supply, sewage, gas)	0.0110	0.0000	0.3459	0.0056
	Development centers for enterprise and agriculture	0.4842	0.0496	0.0542	-0.0007
	No. of young people leaving the village	0.3772	0.0000	0.1338	0.0013
	Village budget income per 1 inhabitant	0.4893	0.0866	0.0473	-0.0103
Innings of the mayor	Development centers for enterprise and agriculture	0.5023	0.4426	0.0212	-0.00980
	Village budget income per 1 inhabitant	0.5049	0.7391	0.0092	72.5450
	Number of public meetings of municipal council/year	0.4304	0.0002	0.1020	-0.2882

Source: Set of village data (2003); Statistical Lexicon of Municipalities in the Czech Republic 2000 (2001); own calculation

- with another village, capabilities of development of enterprise and housing, number of public activities to develop the village
- activity of inhabitants – young people leaving the village, number of active interest organizations in the village and number of their activities organized for the public
- social problems and village facilities.

The monitored set of randomly selected rural villages represents more than one quarter¹ of the total number of rural villages in the Czech Republic and therefore it is statistically representative. Hence it is possible to consider the findings on 80% level of variability significant for the total set of villages in the Czech Republic.

The fact that factors are not interdependent enabled us to consider the relations of selected indicators by means of linear regression. Multiple regression coefficients were used to express the change of dependent variable if an independent variable changes by one. For this purpose indicators or groups of indicators were regarded independent variables.

Only such indicators whose relations brought some practical meaning were involved in calculation. The calculations were performed entirely in pair relations. The summary of results of the performed comparisons are shown in Table 3.

The total statistical significance of regression was decisive for further evaluation. Only the relations showing statistical significance of 0.1 and less were evaluated (it means significant for $\geq 90\%$ variability of the set). The high significance of regression coefficient and high value of correlation coefficient that proves the tightness of relation were set as entry criteria for further evaluation.

Table 3 shows that only few relations comply with these requirements. In the first case, the relation mirrors the connection between number of village inhabitants and its civic and technical facilities. The particular regression coefficients show that the increase of civic facilities by one unit² (e.g. food shop establishment) correlates with the increase in number of village inhabitants by 800 and in case of technical facilities even by 1 000 inhabitants. The same relations with village size categories closely correlate to

Table 4. Review of canonical correlations of the Czech villages set (review of non-repetitive relations)

Non-repetitive relations	Coefficient of determination	Correlation coefficient	Statistical significance
Village size category: situation of inhabitants	0.8655	0.9303	0.0000
Village size category: level of village activity	0.0563	0.2373	0.0000
Villages size category: level of activity of village inhabitants	0.1721	0.4148	0.0000
Village size category: level of village facilities	0.6279	0.7924	0.0000
Village size category: No. of young people leaving the village	0.0035	0.0596	0.0311
Village size category: No. of commuting inhabitants	0.4810	0.6936	0.0000
Village size category: capabilities of enterprise development	0.0128	0.1129	0.0000
Village size category: capabilities of non-enterprise development	0.0286	0.1690	0.0000
Situation of inhabitants: level of village activity	0.0559	0.2364	0.0000
Situation of inhabitants: level of activity of village inhabitants	0.0559	0.2364	0.0000
Situation of inhabitants: level of village facilities	0.6112	0.7818	0.0000
Situation of inhabitant: No. of young people leaving the village	0.0188	0.1370	0.0000
Situation of inhabitants: No. of commuting inhabitants	0.5296	0.7277	0.0000
Situation of inhabitants: capabilities of enterprise development	0.0263	0.1623	0.0000
Situation of inhabitants: capabilities of non-enterprise development	0.0341	0.1846	0.0000

Source: Set of village data. Sociological Laboratory of Faculty of Economics and Management, CUA Prague Statistical Lexicon of Municipalities in the Czech Republic 2000; own calculation

¹ There were 5 612 rural villages (villages up to 2 000 inhabitants) in the Czech Republic in 2004. The evaluated set of villages represents 23.36% of the total number of rural villages in the Czech Republic.

² Both civic and technical facilities are represented by three indicators presented in cumulative form.

these findings. Regression coefficients show that the increase of technical facilities by one unit represents the increase of village size category by two or two and half units, it means from the range of up to 200 inhabitants to the range of 500–900 inhabitants or to the next one. The increase of the number of inhabitants is the same as in previous example – it is determined by inner relation of indicators. The relations with population density show the same characteristics. In practice, this means that the improvement in civic and technical facilities of small villages is not possible without outside intervention.

The finding that should be considered serious is that potential agreement to merge with another village, No. of young people leaving the village or budget income range per one inhabitant are not related to the village size.

Canonical correlations enable to evaluate the connections between the groups of indicators. They give way to create connections between such facts that can be expressed only by more than one indicator.

The following significant blocks of indicators were included in the evaluation:

- situation of inhabitants
- level of village activity
- level of activity of village inhabitants
- level of village facilities
- No. of young people leaving the village
- capabilities of enterprise development
- capabilities of non-enterprise development
- village size category

Only relationships with the proven statistical significance (statistical significance coefficient < 0.1) and tight connectedness (correlation coefficient ≥ 0.7) were evaluated (Table 4)³.

Just 5 from the total number of 36 non-repetitive relations coming from the set of villages meet the above mentioned target criteria of statistical significance and correlation.

These non-repetitive relations are:

- situation of inhabitants
 - village facilities
 - commuting to work out of village
 - village size category
- village size
 - village facilities
 - commuting to work out of village

The indicator “village size” is involved in the block “situation of inhabitants”, therefore does not bring

any new underlying information. In practice this means that only two relations were proved as statistical significant and highly correlated – situation of inhabitants with village facilities and range of commuting out of village.

CONCLUSION

The Czech Republic is characterized by the fractured structure of settlement with the historically given high number of villages. In 2004, the rural population (in municipalities lower than 2 000 inhabitants) represented 26.3% of the total population. There are 5 612 of such rural villages in the Czech territory, which represent 89.82% of all municipalities. These villages cover 73.6% of the territory of the Czech Republic.

The demographic and socio-economic situation in villages with lower number of inhabitants is not favorable. The impact of negative factors (e.g. the rapid decrease of job opportunities, the decreasing level of transport services provided by public transportation, the difficult environment for performance of public administration etc.), that drives down the chances of utilization of natural-economic and human potential, is expressed heavily unfavorably especially in villages up to 2 000 inhabitants.

The challenge of the research that has been done in 2004 was to define rural areas’ problem characteristics which translate into the significant regional differences as well as their structure and interconnectedness.

The indicators of village facilities and demographic data show the highest number of statistically significant pair correlations. It was also found that the size of villages decreased with the increasing distance from civic centers.

The statistical significant connection between number of village inhabitants and its civic and technical facilities was quantified by linear regression. The coefficients show that the increase of civic facilities by one unit (e.g. food shop establishment) correlates with the increase of number of village inhabitants by 800 to 1 000. In practice, this recognition means that the improvement in civic and technical facilities of small villages is not possible without outside intervention. The relations of facilities improvement with the village size category or the density of population show the same characteristics. On the contrary, the size of village does not have association with its

³ Regarding the extent of the final table, the presented Table 4 shows only non-repetitive relations that meet the target criteria of statistical significance and correlation.

willingness to merge with other villages, the number of young people leaving the village and the level of budget income per 1 village inhabitant.

The apposite characteristics of rural villages can be obtained from results of the factor analysis of statistical representative set of 1 311 villages. The analysis shows that the particular factors (and therefore dominant indicators as well) are not interdependent. The dominant indicators make up four significant blocks: the situation of inhabitants, village activity, inhabitants activity and others (social problems and village facilities).

The canonical correlations proved results from factor analysis related to connections between partial data that characterized the situation of inhabitants in the village and its civic and technical facilities. Just 5 from the total number of 36 non-repetitive relations meet the target criteria of statistical significance coefficient < 0.1 and correlation coefficient ≥ 0.7 .

These non-repetitive relations are:

- situation of inhabitants
 - village facilities
 - commuting to work out of village
 - village size category
- village size
 - village facilities
 - commuting to work out of village

Even in such extensive set of villages, no other statistical significant relations were identified. It means that in case any general tendency to rural differentiation exists, it is evoked by other than the explored influences.

It can be concluded that the initial hypothesis about significant differentiations related to village location, size, distance from civic centers and other aspects, was not proved. No significant connection that could

serve as the basis for general differentiation criteria construction was found.

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Arrived on 29th November 2005

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