

ROAD INFRASTRUCTURE AS A CRITERION OF THE CZECH TAX ASSIGNMENT SYSTEM

[Silniční infrastruktura jako kritérium pro český systém přerozdělování daní]

Eva Marečková¹

¹*VŠB – Technical University of Ostrava, Faculty of Economics, Sokolská třída 33, 701 21 Ostrava
Email: eva.mareckova.st@vsb.cz*

Abstract: This paper deals with the field of road infrastructure. The aim of this paper is to determine whether the extent of roads in the municipality, the population of the municipality, traffic intensity in the municipality or the aspect of time affect municipal expenditures in the field of road infrastructure. The influence of these variables is studied in this paper by means of correlation and regression analysis between the extent of roads or the number of inhabitants and municipal expenditures in the field of road infrastructure converted to the unit of the extent. The analysis is performed with respect to all communities regardless of their size, in terms of size categories of municipalities and in terms of time horizon. The paper evaluates whether it is appropriate to use the road infrastructure as a criterion for the Czech tax assignment system. The analysis is based on the example of the Zlín Region municipalities.

Keywords: Czech Republic, municipality, municipal expenditure, population, road infrastructure, tax assignment system, Zlín Region.

JEL classification: H71, H77

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Introduction

Act No. 243/2000 Coll. Tax Assignment System (referred to as "the act") defines distribution of centrally collected taxes to the municipalities. Tax assignment system (referred to as "TAS") is based on a fixed structure of taxes and on several criteria and their balance, which then through implementing decree of the Act determine the specific shares assigned to individual municipalities.

Due to the fact that income received from tax revenues accounts for more than half of municipal resources, setting of this act significantly affects financial management of municipalities. Any sort of change in this act would cause a strong response from municipalities. The changes are most often related to the criteria on which the taxes are distributed. In the course of validity of this act, the number of criteria has increased or they have been modified. As one of the possible criterion was (and still seems to be) considered the criterion of municipals road infrastructure.

Municipalities give significant consideration to the financial management of road infrastructure as it is one of the most expensive as well as one of the most obvious sectors of the municipality. Great financial demand illustrates the proportion of this expenditure field in the total expenditures of municipalities, which reaches about 9 %. In addition to others this particular field of road infrastructure was identified in the research of University of Economics in Prague as one of the most expensive field in terms of capacity and time requirements for operation and maintenance.

The field of road infrastructure is also an important component of economic and social development of the municipality. The structure of the road network and the extent of parking

areas influence the decision of economic entities on business location and the scope of sidewalks, cycling paths and various tertiary roads may in turn affect the behavior of individuals. The consequences of the behavior and decision-making of economic entities and individuals are then multiplied to the municipality through the setting of incentives TAS. Apart of TAS also can well adjusted and maintained network of cycling paths have positive impact on tourism.

Reasons outlined above illustrate the importance of road infrastructure and thus indicate the suitability of using criterion of road infrastructure within the TAS. However, an important aspect is whether the extent of the roads influences the expenditures of municipality and how significant is this influence. Besides the extent of roads, the municipal expenditures in this field could be influenced by traffic intensity and time.

1 Paper methodology

The paper therefore examines the dependence between the extent of roads, resp. population and expenditures per unit of the extent of roads. The existence of dependence between the variables, its intensity and the course is studied in this paper by using correlation and regression analysis.

Correlation coefficient investigates the dependency ratio between the extent of roads (see definition of the extent of roads later in this chapter), respectively population and expenditures of the municipality per unit extent of roads (see definition of expenditures later in this chapter). Municipal expenditures are converted by the extent of roads to determine of real cost of one kilometer or hectare of roads in individual municipalities. Subsequently, they are correlated with the extent of roads and population in the municipality. The correlation coefficient is given by the following formula:

$$r_{xy} = \frac{s_{xy}}{\sqrt{s_x^2 \cdot s_y^2}}, \quad (1)$$

where

r_{xy}	correlation coefficient,
s_{xy}	covariance of variables x and y ,
s_x^2, s_y^2	dispersion of empirical values x and y .

If the correlation coefficient value is approaching to $|1|$, dependency ratio between variables is more important and vice versa. However, the high value of correlation coefficient does not necessarily mean a causal dependency between variables. Therefore, statistical significance of calculated correlation coefficients is tested. In terms of this test, the hypothesis of zero value of correlation coefficient against hypothesis of not-zero value of correlation coefficient ($H_0: r_{xy} = 0$ proti $H_1: r_{xy} \neq 0$) is verified. In this verification, the following test criterion is calculated:

$$T = \frac{r_{xy} \sqrt{n-2}}{\sqrt{1-r_{yx}^2}}, \quad (2)$$

where

T	test criterion,
$n-2$	degree of freedom.

Subsequently, critical values of students distribution t with $n - 2$ degree of freedom on 5 % significance level α are examined (i.e. $t_{1-\alpha/2}$ for $n - 2$ and $t_{\alpha/2}$ for $n - 2$). If the calculated value

of test criterion T falls into critical range (i.e. $T > t_{1-\alpha/2}$ for $n - 2$ and $T < t_{\alpha/2}$ for $n - 2$), zero hypothesis is rejected and correlation coefficient is considered as statistically significant. In this paper, the statistical significance of individual correlation coefficients is given by abbreviation SS (statistically significant) or SI (statistically insignificant) on the place of individual values of correlation coefficients in tables.

Correlation analysis is not performed only in terms of roads extent for all municipalities of Zlín Region as a whole, but also in terms of size categories of municipalities or time aspect.

Regression coefficient is used to examine how large is the average change in municipal expenditures per unit of roads extent (in the view of the consequence) along with change of roads extent by one unit, or population by one person (in the view of reasons). The value of regression coefficient is given by value of b_1 in following equation of linear regression:

$$y = b_0 + b_1 \cdot x \quad (3)$$

<i>where</i>	y	<i>regression function (equation),</i>
	b_0, b_1	<i>parameters of regression function (equation),</i>
	x	<i>value of the explanatory variable.</i>

Regression analysis is performed in terms of roads extent for all municipalities of Zlín Region as a whole.

The definition of road infrastructure (respectively roads¹) for the purpose of this paper is very difficult. Currently, there is no single database, which defines the extent of roads in municipalities. Thus, for the purposes of this paper, alternative approach to definition will be used.

In 2007, the Czech Statistical Office has carried survey on the extent of roads in each municipality. This survey should determine the length of the roads, where the roads were based on § 6 of Act No. 13/1997 Coll., Road Infrastructure and its implementing decree of the Ministry of Transport No. 104/1997 Coll. According to the provisions of these legal rules, the total length of local roads includes the length of local roads in the municipality, collection and service local roads and sidewalks, pedestrian walks, cycling paths, paths in cottage areas, calmed roads, pedestrian zones, etc. For purpose of this paper, the determination of the length of roads in kilometres will be based on this definition; so-called the length of local roads. According to this survey, it was found that over 4 000 km of local roads is located in municipalities of Zlín Region.

However, the roads are significant not only in length, but also in their area. The reason is that some municipalities may have dual roads and even in terms of the length of roads may be similar to other municipalities, in terms of their area will be different. Thus, current expenditures and investments in the field of road infrastructure may then between these municipalities significantly differ. However, when trying to obtain data on area of roads in each municipality (according to § 6 of Act No. 13/1997 Coll.) it was found that this data is not registered anywhere and therefore can not be obtained. To determine the total area of roads this paper will use the data obtained from the Czech Office for Surveying, Mapping and Cadastre. This authority includes data on the area of land in the municipalities in accordance with the Land Registry Decree No. 26/2007 Coll. and in accordance with the Annex to this Decree. Distribution of land in the Real Estate Registry does not allow independent

¹ For purpose of this paper, the term of „road infrastructure” and the term of „roads“ are synonyms.

management of local roads in accordance with § 6 of Act No. 13/1997 and introduces the term so-called “other roads“.

Other roads area covers an area of local roads in accordance with § 6 of Act No. 13/1997 Coll. and also the area of tertiary roads in accordance with § 7 of Act No. 13/1997 Coll. Tertiary road is in accordance with § 7 of Act No. 13/1997 Coll. road, which is used to connect individual properties among themselves, with other roads or in order to cultivate agricultural and forest land and Land registry emphasizes that this is a paved road². Behind a tertiary road is also considered the road in an enclosed area or object that serves the need of the owner or operator of a confined space, which may or may not be publicly accessible. For determining the area of roads in ha will be for purpose of this paper went from this definition; so-called the area of other roads. According to the data of the Czech Office for Surveying, Mapping and Cadastre, other roads are located on the area of over 8 000 hectares of area of municipalities of Zlín Region.

The correlation and regression analysis are using municipal expenditures in the field of road infrastructure, i.e. current expenditures and investments in roadways, sidewalks, bike paths, etc.; namely expenditures from budgetary subsections 221 (in terms of sector classification of budgetary structure). The municipal expenditures are divided into current, capital and total expenditures (in terms of kind classification of budgetary structure). Thus defined expenditures of all municipalities of the Zlín Region are mentioned in Table 1. The development of municipal expenditures reflects the economic development and financial situation of municipalities. Until 2009, capital expenditures associated with significant municipal investment activity were significantly increasing, since 2010 they have fallen and, on the contrary, current expenditures associated with the administration and minor repairs and maintenance of road network have increased.

Table 1: Expenditures of municipalities of Zlín Region in budgetary subsection 221 (in mil. CZK)

	2007	2008	2009	2010	2011
Current expenditures	396.39	374.25	358.10	367.58	395.74
Capital expenditures	439.56	610.75	1 013.13	615.52	516.98
Total expenditures	835.95	984.99	1 371.23	983.10	912.71

Source: Ministry of Finance of the Czech Republic, 2013.

The paper has analyzed data on municipalities of Zlín Region. There were 304 municipalities in the Zlín Region in the period 2007 – 2011, which represents less than 5 % of the municipalities of the Czech Republic, an average of about 589 thousand population, which represents less than 6 % of the population of the Czech Republic and is located on 396 thousand ha, which represents a 5 % of total area of the Czech Republic.

The aim of this paper is to determine whether the extent of roads in the municipality, eventually population in the municipality, traffic intensity and time aspect have influence on expenditures just converted by this extent of these roads. The paper has also examined the average change in expenditures converted into the extent of roads in case of change of the extent of roads by one unit and in case of change of the number of inhabitants in the municipality by one person.

² Paved road is road paved with bituminous, panel or flagged surface along its entire length.

2 Findings

2.1 Extent of roads

The length of local roads according to data from the Czech Statistical Office

Municipal expenditures in the field of road infrastructure have been converted by the length of local roads in km and subsequently correlated with the length of local roads in km in the municipality and with the number of inhabitants of the municipality.

Table 2: Average coefficient of correlation and regression for the years 2007 to 2011³

	Current expenditures	Capital expenditures	Total expenditures
CC „length of LR“ x „expenditures/length of LR“	0.02 SI	0.07 SI	0.06 SI
CC „population“ x „expenditures/length of LR“	0.14 SS	0.15 SS	0.18 SS
CR „length of LR“ x „expenditures/length of LR“	0.0625	0.8823	0.9448
CR „population“ x „expenditures/length of LR“	0.0041	0.0088	0.0129

Source: own processing, 2013.

From Table 2 it is evident that there is practically no relationship between the length of local roads and expenditures converted to 1 km of local roads in either case; correlation coefficients are statistically insignificant. The relationship is low, even in the case of correlation of the expenditures converted to 1 km of local roads with the number of inhabitants, although in this case, correlation coefficients are statistically significant.

Although significant relationship between these variables was not demonstrated, in order to sustain continuity and coherence of the paper, regression coefficient is included in this chapter as well. In case of change of the length of local roads by 1 km, current expenditures converted to 1 km of local roads change by an average of 63 CZK, in case of change of the number of inhabitants by one person, the current expenditures converted to 1 km of local roads change by an average of 4 CZK. Analogously, the data can be deducted for capital and total expenditures. Low values of regression coefficients prove low relationship proved by correlation coefficient.

The area of other roads according to data of the Czech Office for Surveying and Land Registry

Municipal expenditures in the field of road infrastructure have been converted by the area of other roads in ha and subsequently correlated with the area of other roads in the municipality and the number of inhabitants.

Table 3: Average coefficient of correlation and regression for the years 2007 to 2011⁴

	Current expenditures	Capital expenditures	Total expenditures
CC „area of OR“ x „expenditures/area of OR“	0.27 SS	0.25 SS	0.31 SS
CC „population“ x „expenditures/area of OR“	0.31 SS	0.25 SS	0.34 SS
CR „area of OR“ x „expenditures/area of OR“	0.3819	0.7845	1.1664
CR „population“ x „expenditures/area of OR“	0.0027	0.0050	0.0077

Source: own processing, 2013.

³ CC = correlation coefficient; CR = regression coefficient; LR = local roads; SS = statistically significant; SI = statistically insignificant.

⁴ CC = correlation coefficient; CR = regression coefficient; OR = other roads; SS = statistically significant; SI = statistically insignificant.

The medium relationship of the area of other roads and expenditures converted to 1 ha of other roads is evident from Table 3. Slightly higher is relationship between municipal expenditures per 1 ha of other roads in the municipality and the number of inhabitants. The correlation coefficients are statistically significant in both cases.

The given table also displays values of the regression coefficients. From the data it can be seen that change the area of other roads about 1 ha changes the current expenditures on 1 ha by 238 CZK, the change of number of inhabitants by one citizen changes the current expenditures per 1 ha in average by 3 CZK.

The dependency ratio is affected in particular by the extent of roads. However, there are other factors that could affect the municipal expenditures in the field of road infrastructure. In particular, the intensity of use of roads and ,considering that capital expenditures form greater part of this expenditure field, also investment recovery interval.

2.2 Intensity of use of roads

There is a presumption that the intensity of use of roads is more significant in bigger municipalities and towns. In bigger municipalities and towns is much more traffic on the roads and also the intensity of use of sidewalks, biking trails incl. their construction is greater than in small municipalities. In this regard, the correlation analysis of the size categories of municipalities is performed in the following part of the paper. The size categories are determined by Act No. 243/2000 Coll., tax assignment system. The paper is focused on examination of expenditures in the years 2007 to 2011, where in 2007 this act determined 14 size categories. Currently (2013), this act specifies four size categories. For the purposes of this paper the size categories take into account both mentioned approaches and they are shown in the following Table 4.

Table 4: Size categories of municipalities for purpose of this paper

Size categories of municipalities in terms of Act No. 243/2000 Coll., state to 31 th December 2007	Size categories of municipalities for purpose of this paper	Size categories of municipalities in terms of Act No. 243/2000 Coll., state 1 st January 2013
1 to 100	1 to 50	1 to 50
	51 to 100	51 to 2 000
101 to 200	101 to 200	
201 to 300	201 to 300	
301 to 1 500	301 to 500	
	501 to 1 000	
	1 001 to 1 500	
1 501 to 5 000	1 501 to 2 000	2 001 to 30 000
	2 001 to 5 000	
5 001 to 10 000	5 001 to 10 000	
10 001 to 20 000	10 001 to 20 000	
20 001 to 30 000	20 001 to 30 000	
50 001 to 100 000	Zlin	30 001 and more

Source: Act No. 243/2000 Coll., own processing, 2013.

In the following part of the paper, a correlation analysis between municipal expenditures in the field of road infrastructure converted to the extent of roads in the municipality and the extent of roads in the municipality, eventually population in the municipality is performed and it is performed in terms of the above-mentioned size categories.

The length of local roads according to the Czech Statistical Office

Within the individual size categories of municipalities, municipal expenditures in the field of road infrastructure have been converted by length of local roads in km and subsequently correlated with the length of local roads in the municipality and the number of inhabitants. The average values of correlation coefficients in terms of size categories in the years 2007 to 2011 are displayed in Table 5.

Table 5: Average coefficients of correlation in terms of size categories in period 2007 to 2011⁵

Size categories	„CuE/KM“ x „population“	„CaE/KM“ x „population“	„ToE/KM“ x „population“	„CuE/KM“ x „length of LR“	„CaE/KM“ x „length of LR “	„ToE/KM“ x „length of LR “
1 to 50	-0.40 SI	0.00 SI	-0.40 SI	-0.40 SI	0.00 SI	-0.40 SI
51 to 100	-0.41 SI	0.00 SI	-0.41 SI	-0.20 SI	0.00 SI	-0.20 SI
101 to 200	0.13 SI	-0.03 SI	0.12 SI	0.18 SI	-0.21 SI	0.02 SI
201 to 300	0.03 SI	0.03 SI	0.04 SI	-0.26 SI	-0.08 SI	-0.19 SI
301 to 500	0.10 SI	0.12 SI	0.11 SI	-0.15 SI	-0.13 SI	-0.19 SI
501 to 1 000	0.15 SI	0.04 SI	0.10 SI	-0.17 SI	-0.06 SI	-0.13 SI
1 001 to 1 500	0.04 SI	0.11 SI	0.09 SI	-0.24 SI	-0.06 SI	-0.15 SI
1 501 to 2 000	0.29 SI	0.05 SI	0.22 SI	-0.09 SI	-0.07 SI	-0.12 SI
2 001 to 5 000	-0.16 SI	0.15 SI	0.05 SI	-0.10 SI	0.03 SI	-0.02 SI
5 001 to 10 000	0.10 SI	0.28 SI	0.29 SI	0.22 SI	0.13 SI	0.14 SI
10 001 to 20 000	0.90 SS	0.61 SI	0.71 SI	-0.38 SI	-0.10 SI	-0.15 SI
20 001 to 30 000	0.39 SI	-0.45 SI	-0.26 SI	-0.05 SI	-0.34 SI	-0.38 SI
Zlín	x	x	x	x	x	x

Source: own processing, 2013.

From Table 5 it is evident that in terms of the correlation of expenditures per 1 km with number of inhabitants, the values of correlation coefficients grow with growth of the size category of municipalities. It shows the slight trend that confirms the assumption that bigger municipalities and towns may have more expenditures in the field of road infrastructure due to increased traffic volumes. However, the correlation coefficients are mostly statistically insignificant which is mainly due to small number of municipalities in certain size categories.

However, negative values of the coefficients of correlation between expenditures per 1 km and the length of local roads in various categories are quite interesting phenomenon. In the respective size categories, the municipal expenditures calculated on the length of local roads are decreasing with the growth of the length of local roads.

Relatively high values of correlation coefficients in the two smallest size categories are caused by the existence of one or two municipalities in the respective categories in different years. The correlation coefficients either could not be calculated or their value was absolute and then followed by averaging, which resulted in significant increase in value.

The area of other roads according to the Czech Surveying and Land Registry Office

Within the individual size categories of municipalities, the municipal expenditures in the field of road infrastructure have been converted by area of other roads in ha and subsequently correlated with the area of other roads in the municipality and with the number of inhabitants. The average value of correlation coefficients in terms of size categories in the years 2007 to 2011 are displayed in Table 6.

⁵ CuE = current expenditures; CaE = capital expenditures; ToE = total expenditures; KM = kilometre, length of local roads; LR = local roads; SS = statistically significant; SI = statistically insignificant.

Table 6: Average coefficients of correlation in terms of size categories in period 2007 to 2011⁶

Size categories	„CuE/HA“ x „population“	„CaE/HA“ x „population“	„ToE/HA“ x „population“	„CuE/HA“ x „area of OR“	„CaE/HA“ x „area of OR“	„ToE/HA“ x „area of OR“
1 to 50	-0.40 SI	0.00 SI	0.00 SI	0.00 SI	0.00 SI	0.00 SI
51 to 100	-0.41 SI	0.00 SI	0.40 SI	-0.10 SI	0.00 SI	-0.08 SI
101 to 200	0.02 SI	-0.01 SI	0.18 SI	-0.30 SI	0.01 SI	-0.23 SI
201 to 300	0.19 SI	0.11 SI	0.23 SI	-0.12 SI	-0.13 SI	-0.33 SI
301 to 500	0.12 SI	0.15 SI	-0.05 SI	-0.27 SI	-0.10 SI	-0.14 SI
501 to 1 000	0.15 SI	0.08 SI	0.08 SI	-0.21 SI	-0.16 SI	-0.19 SI
1 001 to 1 500	-0.21 SI	-0.02 SI	-0.09 SI	-0.36 SI	-0.17 SI	-0.24 SI
1 501 to 2 000	0.01 SI	-0.10 SI	0.02 SI	-0.20 SI	-0.22 SI	-0.06 SI
2 001 to 5 000	0.01 SI	0.23 SI	0.12 SI	-0.28 SI	-0.14 SI	-0.29 SI
5 001 to 10 000	0.06 SI	0.22 SI	-0.11 SI	0.10 SI	0.28 SI	0.22 SI
10 001 to 20 000	0.45 SI	0.44 SI	0.55 SI	-0.55 SI	-0.70 SI	-0.42 SI
20 001 to 30 000	-0.06 SI	-0.27 SI	-0.33 SI	-0.75 SI	-0.84 SI	-0.78 SI
Zlín	x	x	x	x	x	x

Source: own processing, 2013.

Table 6 indicates that the trend of growth of municipal expenditures on the area of other roads in relation to the growth of size categories of municipalities is most significant in the field of investments. Correlation coefficients at their highest values indicate rather moderate level of dependence. It can be stated that the values of correlation coefficients in the case of “the area of other roads” (in this part of this chapter No. 2.2) are slightly higher than correlation coefficients values in the case of “the length of local roads” (in previous part of this chapter No. 2.2). However, the correlation coefficients are statistically insignificant which is mainly due to small number of municipalities in certain size categories also.

The values of correlation coefficients between expenditures on the area of other roads in municipality and the area of other roads in municipality are slightly higher than when the correlation is examined between expenditures and the number of inhabitants. Even in this case, correlation coefficients values are negative, which suggests that with the growth of other roads area in municipality within the one size category the expenditures on the area of the roads are decreasing.

2.3 Investment recovery interval

Within the municipal expenditures in the field of road infrastructure, the capital expenditures make more than two thirds. Therefore, the investment issue in this field has quite significant importance. While the management, repair and maintenance of roads take place constantly, investment in the field of road infrastructure is not on annual basis. According to the Czech Accounting Standard No. 708 the field of road constructions (including roads in municipalities, local roads and utility infrastructure, parking and areas of local roads) belongs to VI. accounting depreciation category with fixed period of use for 50 years.

⁶ CuE = current expenditures; CaE = capital expenditures; ToE = total expenditures; HA = hectare, area of other roads; OR = other roads; SS = statistically significant; SI = statistically insignificant.

In order to carry out entirely relevant analysis, it would be necessary to obtain the data within 50 years time period. However, it is impossible due to the absence of local government at the municipal level before 1990 and summary data on the financial management of municipalities before 2001.

In the following part of the paper, the correlation analysis has been carried out between municipal expenditures in the field of road infrastructure converted to the extent of roads in the municipality and the extent of roads in the municipality, eventually municipality population for 10 years time period, particularly for the years 2002 and 2011.

The length of local roads according to the Czech Statistical Office

Municipal expenditures in the field of road infrastructure have been converted by the length of local roads in km and consequently correlated with the length of local roads in the municipality and the number of inhabitants in the municipality, considering years 2002 and 2011. Particular values of correlation coefficients in both years are displayed in Table 7.

Table 7: Comparison of correlation coefficients in 2002 and 2011⁷

	Current expenditures	Capital expenditures	Total expenditures
„length of LR“ x „expenditures in 2002/length of LR “	0.04 SI	0.08 SI	0.04 SI
„length of LR“ x „expenditures in 2011/length of LR“	-0.01 SI	0.14 SS	0.08 SI
„population“ x „expenditures 2002/length of LR“	0.17 SS	0.10 SI	0.17 SS
„population“ x „expenditures in 2011/length of LR “	0.08 SI	0.22 SS	0.19 SS

Source: own processing, 2013.

The dependency level based on the calculated values of correlation coefficients is lower or non-existent and it is slightly higher for correlation between expenditures and population. Also, it is evident that in terms of correlation of capital expenditure is dependency slightly higher than in terms of current expenditure and, at the same time, that it is stronger in 2011 than in 2002; correlation coefficients for capital expenditures are statistically significant in 2011. Correlation coefficients for current expenditures are mostly statistically insignificant.

The area of other roads according to the Czech Surveying and Land Registry Office

Municipal expenditures in the field of road infrastructure have been converted by the area of other roads in ha and consequently correlated with the area of other roads in the municipality and the number of inhabitants in the municipality, considering years 2002 and 2011. Particular values of correlation coefficients in both years are displayed in Table 8.

⁷ LR = local roads; SS = statistically significant; SI = statistically insignificant.

Table 8: Comparison of correlation coefficients in 2002 and 2011⁸

	Current expenditures	Capital expenditures	Total expenditures
„area of OR“ x „expenditures in 2002/area of OR“	0.33 SS	0.18 SS	0.27 SS
„area of OR“ x „expenditures in 2011/area of OR“	0.20 SS	0.30 SS	0.34 SS
„area of OR“ x „expenditures in 2002/area of OR“	0.38 SS	0.17 SS	0.28 SS
„area of OR“ x „expenditures in 2011/area of OR“	0.23 SS	0.26 SS	0.33 SS

Source: own processing, 2013.

The dependency level based on the calculated values of correlation coefficients is low to moderate. Considering current expenditures the dependency ratio is stronger in 2002, considering capital expenditures is dependency ratio stronger in 2011. But, in this case, all correlation coefficients are statistically significant.

Conclusion

The share of current expenditures in the field of road infrastructure reach up to average about 5 % of the sum of current expenditures, the share of capital expenditures on all the capital expenditures is about 17 % and the share of total expenditures on the sum of total expenditures is less than 9 %. It results in fact that expenditures in the field of road infrastructure are really important for the municipality, particularly in the field of investments. These results are also confirmed in the above mentioned research University of Economics in Prague. The importance of the field of road infrastructure is increasing in the context of the current technical condition of the roads, where a significant investment in this field is expected in the context of the influence of roads on economic and social development of the municipality.

The aim of this paper was to determine whether and to what the extent of roads in the municipality, eventually population, traffic intensity and the time aspect in the municipality affect expenditures converted by the extent of roads. The extent of roads has been determined by the length of local roads and the area of other roads.

Looking at the values of correlation coefficients it can be concluded that the relationship between expenditures on extent of roads and extent of roads is more significant in the case of area. While the values of correlation coefficients in the case of the length are almost zero, in case of the area the values reach up to approximately 0.3. Also it can be stated that in the case of the area, correlation coefficients are statistically significant; in the case of the length, correlation coefficients are statistically insignificant.

Similar results, although not with such difference, can be observed even if the correlation is between number of inhabitants and expenditures on the extent of roads. In this case, both correlation coefficients are statistically significant, although relationship of population and expenditures converted per 1 km is low (correlation coefficient is about 0.1) and the relationship between the population and expenditures on 1 ha of roads is higher (0.3).

The regression coefficient calculated between the extent of roads and expenditures converted to the extent of roads cannot be compared, because these are two different independent

⁸ OR = other roads; SS = statistically significant; SI = statistically insignificant.

variables (the length and the area). When examining the regression coefficients between the population and expenditures converted by extent of roads is seen that a change in the population will increase more expenditures converted on the length of local roads than expenditures converted on the area of other roads, the difference is not significant. It may have some significance that the area of other roads includes tertiary roads; however small difference suggests a rather low influence of tertiary roads.

Generally it can be stated, that the dependency between the population and municipal expenditures converted to the extent of roads is higher (than in the case of dependence between the extent of roads and municipal expenditures converted to extent of roads), but the dependence is higher among the population and expenditures on roads converted to 1 ha (on the area of other roads).

There are other factors that may have influence on expenditures in the field of road infrastructure; in particular, the intensity of use of the road infrastructure and investment recovery interval.

With the growth of size categories of municipalities (and hence with more frequent use of roads) the value of the correlation coefficient increases, which may mean that in municipalities with higher populations is the relationship between municipal expenditures on the extent of roads and a population slightly stronger than in municipalities with low population. Assuming that in larger municipalities and towns, the traffic volume is much higher than in small municipalities, it can be stated that the volume of traffic may have influence on municipal expenditures in the field of road infrastructure. These can not be said definitively mainly due to the lower number of municipalities in certain size categories; it may be a subject for further investigation. In terms of dependency between expenditures on extent of roads and extent of roads in different size categories was found that within a given size category, there was a decrease of expenditures with growth of extent of roads.

It was also determined that the aspect of time may have influence on the investment in the field of road infrastructure, however this influence was not proved to be too important.

The question remains whether the extent of roads is relevant in relationship to its use in Czech TAS. The dependence is not strong. However, based on the analysis of the relationship between the number of pupils in primary schools (or population) and current municipal expenditures recalculated to the number of pupils in primary schools (see Marečková, 2011) it can be stated that dependence has been demonstrated with similar value.

The problem related to this field remains the availability of relevant data on the extent of roads for purpose of accurate analysis. The length of local roads was investigated by the Czech Statistical Office, therefore it can be assumed that these are relatively accurate data. Regarding other roads area, the issue of availability of relevant data is more difficult. The area of other roads includes local roads as well as tertiary roads, which may misinterpret analysis to some extent. If the Czech Office for Surveying, Mapping and Cadastre would be able to keep data on the area of local roads independently, it would be possible to verify this conclusion with much more confidence.

Even so, on the basis of the above findings and conclusion it can be stated that the field of road infrastructure has an impact on expenditures of municipalities and that it is quite significant. Thus, if considered adjustment of Czech TAS in sense of increasing the number of

criteria for redistribution, it would be possible to consider this criterion more, particularly about the area of roads. However, when examining the relationship between population and the length of local roads (the value of the correlation coefficient is 0.84) and population and the area of other local roads (the value of the correlation coefficient is 0.93) is seen as a very strong or almost absolute dependence. Even when population is correlated with the municipal expenditures in the field of road infrastructure, the correlation coefficient is almost always higher than if the municipal expenditures in the field of road infrastructure are correlated with the extent of roads. Why then the Czech TAS complicate by other criterion? In relation to the above, it can be concluded considering the results of analysis and its findings and in terms of simplicity, clarity and comprehensibility of the Czech TAS is more suitable not to include the criterion of road infrastructure and sustain its influence only by the criterion of number of inhabitants.

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