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COMPETITIVE ENVIRONMENT IN WASTE MANAGEMENT AND ITS IMPACT ON MUNICIPAL EXPENDITURES

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Abstract

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This paper is based on the analysis of competitive environment in waste management in the South Moravian Region and its impact on current municipal expenditures. The paper presents the changes in the development of the municipal waste management and more specifically in the municipal solid waste expenditure per capita of the municipalities from South Moravia Region in the Czech Republic. The main goal of this paper is to examine the impact of competitive environment on the expenditure efficiency. We assume that spatial aspect of competitive environment has significant influence on the expenditure. This hypothesis was based on results of research rejected. The paper compares expenditure per capita for several municipality size groups and the data are also analysed separately for the each of the 7 districts of South Moravia Region in order to identify any significant differences in the development between the districts within the region. The period of the analysis covers 5 years from 2007 to 2011 and the sample consists of all 673 South Moravian municipalities.

competitiveness, waste management, current municipal expenditure, efficiency

Defining and measuring the efficiency, or in other words a process of using resources and their transformation into outputs and outcomes, seems to be one of the biggest issues of contemporary economic theory. Already in 1957 Farell asked the question how to measure efficiency and pointed out its importance for economic policy makers: *it is important to know how far a given industry can be expected to increase its output by simply increasing its efficiency, without absorbing further resources* (Farrell, 1957). Throughout several decades' efficiency evaluation and its technology are greatly improved and advanced. However it still remains conceptual challenge in relation to public expenditures. This issue is also complicated by the fact that outcomes of public sector are often off-market, lacking relevant data and thus making it cannot be quantified, as stated by collective of authors at the European Commission (Mandl *et al.*, 2008). Apart from such methodological complications, it is quite reasonable to assume, competition and some other institutional features (e.g. corporate governance, ownership) affect somehow both quantity and quality of outputs as well as costs of production not only in the marketplace but within the Public Sector too.

It could turn up to be correct mainly in cases, when cross-price elasticity of demand for one product can play its theoretical role – to encourage customers to switch their demand to the most competitively priced products available. We believe it is clearly a case of waste management. Municipalities, either as the customers of private companies offering services or directly services providers, declare quite often their "cost-sensitivity". It seems to be quite reasonable to believe such declarations learning that expenditure on solid waste management accounts on average for 4% of total current municipal expenditure in the Czech Republic, while in case of municipalities with population below 5000 is this share often more than 6%.

There have been published quite a few studies dealing with this topic in economic journals[1]. According to Bel and Warner's complex review (2008) Hirsch (1965) conducted the first econometric study of waste collection in 1965. Using data from 24 municipalities in St. Louis County, Missouri, he found no difference in cost due to public or private contract arrangement.

Similar results have founded American authors Pier *et al*. (1974) on sample in Montana and Collins and Downes (1977) in Missouri. Stevens (1978) examined competitive environment in relation to the city size. The impact of competition in UK analysed Domberger *et al*. (1986) and Cubbin *et al*. (1987).

Later, also Dijkgraaf and Gradus (2007) and Bel andWarner (2008) concluded that competition is more important than ownership for the waste sector efficiency improvement. Bel *et al*. (2010) raised the question regarding the "general" benefits of private sector participation in the waste sector.

In the Czech Republic and Slovakia, there were some works dealing with the economics of waste management. Nemec (2008, 2005) addressed the issue of contracting in the field of waste management services, Pavel (2007) and Ochrana and Maaytová (2012) solved problem of public procurements, Šauer *et al*. (2008) and Slavik and Pavel (2013) were interested in charging systems for municipal solid waste and effectiveness and economy of waste management.

Analysing the South Moravian Region municipalities' solid waste management policy and expenditures we have been examining a role of competition in providing waste management services for a while. Our previous study (Soukopová and Malý, 2012) addressed slightly broader topic, we have tested whether competition play significant role and contribute the waste handling price levels.

This study deals with more specific question, in order to extend our previous results. We are interested in "spatial" aspects of the competition. We assume, that the influence of the competition is greater among the municipalities, which have around neighbouring municipalities with different waste management companies and there exists assumption of lower marginal costs for the competing company when considering expansion and overtaking of a new client (municipality). We also anticipate a demonstration effect involving the behaviour and choice of municipalities as purchasers seeking for the best deal.

MATERIALS AND METHODS

Data about municipal expenditure on waste management from Ministry of Finance of the Czech Republic (MF CR) automated budget systems ARIS[2] and ÚFIS[3] and data about population from Czech Statistical Office were used for the analysis of municipal waste management expenditures efficiency with emphasis on the competitiveness and type of company. Further information were acquired from waste management companies SITA, a. s., RESPONO, a. s. and van Gansewinkel, a. s. Mayors from municipalities provided further information regarding the contraction process, etc.

Examining the influence of environment competitiveness, the map of waste management companies' coverage was used. Following hypotheses offers itself: *The influence of the competition is greater among the municipalities that have neighbours with different contract partner, since there are lower marginal costs for the competing company considering expansion and overtaking of a new client (municipality).*

Theory of groups was used. Individual municipalities were sorted to groups according to whether they have a neighbour municipality with different waste management company contracted than the municipality itself. After creating seven groups of municipalities we have used statistical analysis and have compared the data about the average expenditure per capita, mean value of expenditure per capita and the standard deviation of expenditure per capita with the data from whole South Moravian Region. The power of environment competitiveness was examined also within each district and municipality size. We have not used correlation and regression analysis, because the results of basic statistical analysis were sufficient for confirmation/rejection of the hypothesis.

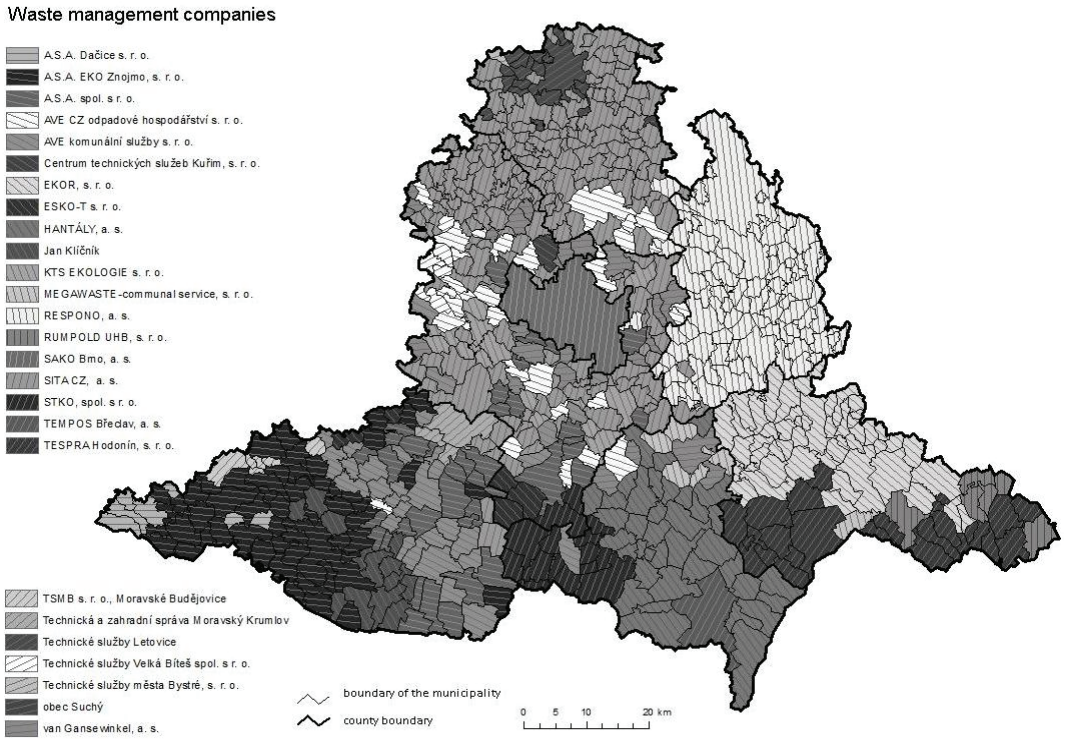
RESULTS AND DISCUSSION

For comparison of individual municipalities were used expenditures per capita. Acquired data are from 2007 to 2011 and represent the expenditure of all 673 South-Moravian municipalities. Individual municipalities were sorted according to whether they have a neighbouring municipality with different waste management company contracted than the municipality itself.

Fig. 1 clearly shows that some municipalities are located within larger territories with common contract partner, while some are located on the border between two or more collection companies' areas.

Analysing average expenditure per capita it was found out mean value, and median value are lowest among municipalities with no competitive environment. These values are extremely different as shows standard deviation. The most extremely value is standard deviation for a group of municipalities with 3 competing waste management

1 For possibly the most recent review see Simões and Marques (2012)
2 http://wwwinfo.mfcr.cz/aris/
3 http://wwwinfo.mfcr.cz/ufis/



1: *Map of collection areas according to the collection companies for year 2011*
Source: Soukopová, Malý (2012)

I: *Results of the analysis of competitive environment influence on average expenditure per capita from 2007 to 2011*

Character of competition	Number of municipalities	Mean ($\bar{x}$)	Median (μ)	Standard deviation (σ)
No competing WMC	167	475.88	446.46	42.42
1 competing WMC	231	550.97	521.65	44.83
2 competing WMC	143	532.28	517.15	45.30
3 competing WMC	39	507.56	506.16	40.79
4 competing WMC	7	517.67	516.84	53.58
South Moravian Region	587	522.97	494.94	44.72

Source: authors

companies and mean value for a municipality with 5 competing waste management companies. The municipalities with extremely different values were removed from the analysis (86 municipalities were removed). Results of the analysis adjusted for extreme values (standard deviation of expenditure is higher than 150 CZK/cap.) are shown in Tab. I.

Results of the analysis completely reject the set hypothesis. Based on the analysis results it can be stated that the *examined spatial aspect of competitive environment does not have any significant influence on the expenditure*. Nevertheless, lower values arise also among municipalities with high level environment competitiveness (3 competing companies among neighbour municipalities). Due to that there cannot be any strong conclusion.

To strengthen the relevance of the results of analysis we examined competitive environment in relation to the city size. Results of the analysis adjusted for extreme values (standard deviation of expenditure is higher than 150 CZK/capita) are shown in Tab. II.

Results of the Tab. II confirm the previous. They point again to the fact that the examined spatial aspect of the competitive environment does not affect the amount of expenditure. This situation is especially pronounced in small municipalities.

To strengthen the relevance of the analysis results the analysis of the influence of competitive environment in individual counties was performed, where there have been assumptions of low impacts of other factors. Analysis was performed on the data adjusted from extreme values. Results of the analysis are shown in Tab. III and Fig. 2.

Looking on the data on a regional level (Fig. 2), we can identify several interesting cases that seem to support partly our hypothesis. Some districts report diminishing expenditures per capita with respect

II: *Results of the analysis of competitive environment influence on average expenditure per capita from 2007 to 2011 in relation of city size*

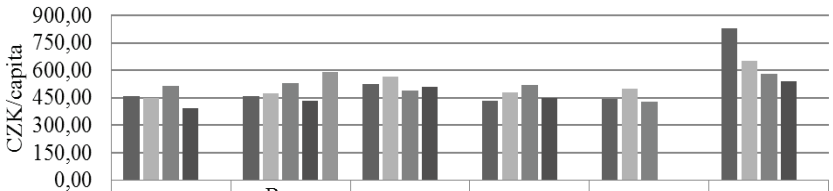
City size (population)	Characterof competition	Number of municipalities	Mean (x̄)	Median (μ)	Standard deviation (σ)
<0, 500)	0 WMC	96	481.31	448.37	42.46
	1 WMC	115	601.61	537.53	54.43
	2 WMC	59	538.63	520.97	60.62
	3 WMC	7	481.96	463.75	67.64
	4 WMC	1	499.31		
<500, 1 000)	0 WMC	45	423.20	428.05	35.67
	1 WMC	72	522.63	504.57	43.15
	2 WMC	56	533.32	517.99	51.97
	3 WMC				
	4 WMC				
<1 000, 10 000)	0 WMC	24	485.63	472.45	32.13
	1 WMC	66	521.11	512.62	46.26
	2 WMC				
	3 WMC				
	4 WMC				
<10 000, 50 000)	0 WMC	1	540.73		
	1 WMC	4	648.35	624.08	45.65
	2 WMC				
	3 WMC				
	4 WMC				

Source: authors

III: *Competitive environment in districts of South Moravian Region*

District	District area (km²)	WMC count	Number of municipalities with given amount of competing WMC among neighbouring municipalities						
			0	1	2	3	4	5	8
Blansko	863	7	55	44	15	1	1	-	-
Brno-City	230	1	-	-	-	-	-	-	1
Brno-Country	1 499	11	31	32	81	37	6	-	-
Břeclav	1 038	7	15	30	15	3	-	-	-
Hodonín	1 099	5	27	38	11	5	1	-	-
Vyškov	876	2	47	25	8	-	-	-	-
Znojmo	1 590	11	7	94	40	2	-	1	-

Source: authors



	Blansko	Brno-Country	Břeclav	Hodonín	Vyškov	Znojmo
0 WMC	462,15	457,63	526,55	434,29	446,08	829,89
1 WMC	450,15	474,47	568,11	480,00	498,93	654,72
2 WMC	517,08	528,48	490,03	523,19	428,58	580,60
3 WMC	393,16	436,18	508,21	447,20		540,84
4 WMC		591,81				

2: *Mean values per capita of WME from 2007 to 2011*
Source: authors

to the number of neighbour municipalities with different contract partners (Znojmo, partly Blansko). Vyškov District represents a specific case. RESPONO waste management company operates on almost whole area of the district – only two municipalities have contracts with waste management company SITA CZ. The municipalities with two available competing waste management companies have the lowest expenditures per capita from whole district.

Nevertheless, other counties cases clearly do not support our hypothesis (Brno-Country District, Břeclav, Hodonín). Based on these inconsistent results it can be stated that the spatial aspect of the competitive environment does not play significant role as a factor of efficiency when considering expenditure on waste management.

Our results are not quite in accordance to previous studies that mostly confirmed that competition is a key feature underlying theoretical claims for costs savings. Domberger *et al*. (1986) looked at 305 municipalities in England and Wales from 1983 to 1985 (before compulsory competitive tendering). They found that in places where there was no competitive contracting, public costs were higher. Where there are larger numbers of bidders, there are more cost savings (Gómez-Lobo and Szymanski, 2001). Competition encouraged public managers to keep costs down. Szymanski and Wilkins (1993) found similar results in the 1984–1988 period. They found a 20% savings in the first year, but these savings disappeared in 2 years, suggesting underbidding by contractors.

We believe there are basically three possible ways to explain our results and it is quite likely that we have dealt with a combination of *three factors* here.

First, the analysis suggests that other factors than lower marginal costs due to close proximity of potential new client (municipality) have higher influence on waste management companies' behaviour. Generally speaking, companies just do not compete locally and they do not take in account such a subtle difference in costs. We are aware a detailed analysis of a cost structure as well as strategic decision making process within companies would be needed in order to follow this idea. That does not necessarily mean the waste management companies do not compete each other for new clients.

The second possible factor is more alarming. Waste management companies operate on a small area and therefore have to cooperate, which notably deforms the competitive environment in the Czech Republic. A recent finding of the Czech "Office for the Protection of Competition" (Antitrust office) confirms there are strong distortions of the competitive environment in this area. The Office has imposed by its first-instance decision a fine amounting to CZK 96,579 million (approximately € 3,825,000) on four large companies. The sanction and prohibition decision has already come into force.

These companies *entered into prohibited agreements on market sharing that led to the distortion of competition* (UOHS, 2012). They had shared their customers through mutual contacts and information sharing, particularly by coordinating their bids for public tenders for waste disposal between the years 2007 and 2011. The Office gathered evidence showing that the companies had maintained business contacts that gradually turned into anticompetitive co-ordination of their actions towards customers. This manifested especially by submitting fake bids in awarding procedures to raise an impression that there was a strong competition among bidders.

The third factor addresses behaviour of municipalities as clients. As we suggested above, we have anticipated a demonstration effect involving municipalities as purchasers who seek for the best deal. We have supposed it is likely the key information can flow easier among neighbours. The price and the overall quality of services is a common concern for mayors as well as municipalities representatives, and it would by natural sharing information about them. Nevertheless, current public procurement legislation makes municipalities impossible to act like a typical private customer – to pick up a service provider on a base of "neighbour's reference", and to negotiate a deal directly with particular provider. Instead, they have to conduct a complex process with significant transaction costs, where the neighbour' s reference is worth nothing.

CONCLUSION

The paper contains results of performed analysis and evaluation of municipal expenditure on solid waste management per capita and evaluation of the influence of environment competitiveness of the efficiency of these expenditures.

Results of the analysis clearly show that within the analysed sample of municipalities one cannot identify any significant influence of the environment competitiveness on the efficiency of municipal solid waste expenditure.

The hypothesis that *examined spatial aspect of competitive environment does not have any significant influence on the expenditure* has been refuted.

It is obvious that the factors that influence the efficiency to a greater extent are price and trade policies of waste management companies, the way of service contraction and the character of waste management company ownership. Important role plays the rate of the waste treatment facility, which was examined in this analysis. That is the reason why the following research will be focused in this direction in order to accept or reject the results of this analysis. Also other mentioned factors would be subsequently examined.

SUMMARY

This paper presents an analysis of competitive environment in waste management in the South Moravian Region and its impact on current municipal expenditures. The paper compares expenditure per capita for several municipality size groups and examines the impact of "spatial" aspects of the competition. An assumption that the influence of the competition is greater among the municipalities, which have around neighbouring municipalities with different waste management companies is tested. The data are also analysed separately for the each of the 7 districts of South Moravia Region in order to identify any significant differences in the development between the districts within the region. The period of the analysis covers 5 years from 2007 to 2011 and the sample consists of all 673 South Moravian municipalities. The results completely reject the hypothesis of stronger influence of competition among municipalities that have neighbours with different contract partner. *Examined spatial aspect of competitive environment does not have any significant influence on the expenditure.*
One of the reasons seems to be existing strong distortions of the competitive environment in the area of waste management confirmed by Office for the Protection of Competition.

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