



**MASARYK UNIVERSITY
FACULTY OF ECONOMICS AND ADMINISTRATION**

Factors Influencing the Selection of Waste Collection Companies by Municipalities – Are Municipal Decision Effective?

Author(s): Jana Soukopová, Vojtěch Ficek

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Jana Soukopová and Vojtěch Ficek

Masaryk University

Faculty of Economics and Administration

Department of Public Economics

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Author 1:

Jana Soukopová is an assistant professor in public finance at the Department of Public Economics, Faculty of Economics and Administration, Masaryk University, Brno, Czech Republic. Her long term research interests include public finance, mathematical methods in public economics, public projects and procurements and environmental economics with a focus on waste management.

Author 2:

Vojtěch Ficek is a postgraduate student at the Department of Public Economics, Faculty of Economics and Administration, Masaryk University, Brno, Czech Republic. His dissertation is focused on environmental economics, especially waste management and its effectiveness.

Abstract

This paper is based on an analysis of factors influencing the selection of waste collection companies by municipal authorities in selected municipalities in the Czech Republic, and their impact on the cost efficiency of current municipal expenditures. The aim of this paper is analysing the factors influencing the choice of waste management company and the influence of these factors on the decision making process, and discussing the relation of these factors to the cost efficiency of municipal waste management. The first part of this paper is focused on the factors influencing the choice of waste management company and the influence of these factors on the decision making process, and discusses the relation of these factors to the cost efficiency of municipal waste management. In the other part of this paper we focus our attention on the form of ownership (public and private companies) and strength of competition as two key factors which are frequently mentioned in many foreign research papers and which influence the importance of other factors. The study uses a quantitative approach to investigate the research questions and analyses original collected qualitative survey data obtained during our own research. A survey was conducted for a selected local public service (waste management) in order to collect data about factors influencing the selection of waste collection companies by 115 municipalities in the Czech Republic. The results show that the most powerful factors that influence the selection of waste collection companies at municipalities in the Czech Republic are the price and the quality of services. It was also clearly shown that the significance of individual factors is related to the competitive environment. The level of significance of individual factors is directly proportional to the strength of the competitive environment.

Key words: municipalities; waste management; waste collection companies; competitiveness; efficiency; municipal decisions; the Czech Republic

JEL classification H76

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1. Introduction

Defining the processes by which public resources are utilised is an essential precondition for increasing efficiency and effectiveness in all municipal activities, including activities related to waste management. Due to the fact that municipal expenditure on solid waste management in 2012 was more than 60% of current expenditure on environmental protection, and accounts on average for 3% of total current municipal expenditure in the Czech Republic, it is obvious that the area of waste management is an integral and indispensable part of municipal budgets. The area of waste management is therefore also a suitable target for measures aimed at saving public resources.

This is one of the many reasons why it is very important to describe all the factors influencing the selection of waste collection companies by municipalities. These factors could play a significant role as factors determining the efficiency and effectiveness of municipal waste management expenditure.

Within this context, the concept of effectiveness has to be discussed. According to Boyne (2003), the main purpose of theorists such as Weber, Taylor and Barnard was to develop models of effective organizations, but by the early 1980s the term 'effectiveness' began to be replaced by narrower concepts such as 'quality'. According to many authors (Prieto and Zofio, 2001; Hendrych, 2003; Veiga and Veiga, 2007), the effectiveness of public services is determined by the level of rational behavior exhibited by municipal representatives.

It is obvious that municipal representatives play the role of responsible guarantors securing waste management services in municipal areas. Municipal representatives should also act according to the tenets of economic rationality and attempt to achieve efficiency and cost effectiveness. However, the choice of a waste management company is affected by many factors. These factors make economically rational behavior very difficult. It is therefore clear that finding and defining these factors can increase the level of economic rationality, or at least reveal the limitations that make such an increase impossible.

The economic literature frequently focuses on two important aspects of waste management: the factors influencing the effectiveness of the provision of waste management services, and the role of specific factors such as the form such service provision takes, or competition. This article investigates both aspects in the conditions of the Czech Republic. Our research questions were:

1. Which factors have a significant influence on the selection of waste management companies by municipalities (and what is their role in terms of measuring effectiveness, and their impact in relation to measuring effectiveness)?
2. Are there any differences in the significance of these factors from the perspective of the form of service provision (public and private companies) and strength of competition?

Hence the aim of the paper is to analyse the factors influencing the choice of waste management company and the influence of these factors on the decision making process, and discuss the relation of these factors to the cost efficiency of municipal waste management with a focus on the competition and form of ownership of waste management companies on the decision making process.

The paper is structured so as to present the answers to our research questions. The first part of the paper provides data about municipal preferences when engaged in the process of choosing a waste management company. The second part presents the results of analyses of the influence of the competitive environment and form of ownership of waste management companies on the decision making process. The final part discusses these results and formulates conclusions.

2. The theoretical framework of the paper

A lot of research has been conducted regarding factors influencing the effectiveness of the provision of waste management services (e.g. Stevens, 1978; McDavid, 1985; Domberger, Meadowcroft and Thompson, 1986; Szymanski and Wilkins, 1993; Reeves and Barrow, 2000; Dijkgraaf and Gradus, 2003; Ohlsson, 2003; Dijkgraaf and Gradus, 2007; Bel and Fageda, 2011, and Bel, Fageda and Mur, 2013). One of the first research papers on the factors influencing the cost of waste management was published by Hirsch in 1965. He summarized five basic factors: the level of technology, the quantity

and quality of the services, the price level, and the impact of a combination of other factors, such as legal restrictions, political restrictions, population density and the location of landfills and incinerators (Hirsch, 1965). Soukopová and Malý (2012, 2013) consider that municipal expenditures are affected by different factors: the amount of municipal waste, the price of the equipment used for municipal waste recovery or disposal, the distance to facilities where municipal waste is recovered or disposed of, transport costs, competition, and the form of waste management company ownership.

Similar conclusions were published by Ohlsson (2003) and Reeves and Barrow (2000). There are many other relevant factors influencing the efficiency of the provision of public services which have been already investigated by many authors (Stevens, 1978; McDavid, 1985; Domberger, Meadowcroft and Thompson, 1986; Szymanski and Wilkins, 1993; Reeves and Barrow, 2000; Dijkgraaf and Gradus, 2003; Ohlsson, 2003; Dijkgraaf and Gradus, 2007; Bel and Fageda, 2011, and Bel, Fageda and Mur, 2013), see Tab. 1.

Tab.1 Factors influencing the cost-effectiveness of municipal waste collection

Factor	Research
Output - Quantity of service (amount of waste, number of pick up points, etc.)	Hirsch (1965); Savas (1977); Stevens (1978); McDavid (1985); Domberger et al. (1986); Bello and Szymanski (1996); Szymanski (1996); Reeves and Barrow (2000); Callan and Thomas (2001); Dijkgraaf and Gradus (2003); Ohlsson (2003); Bel and Costas (2006); Dijkgraaf and Gradus (2007); Pavel (2007); Warner and Bel (2008); Bel; Fageda and Warner (2010); Bel and Fageda (2010); Bel; Fageda and Mur (2013); Dijkgraaf and Gradus (2013)
Quality of service	Hirsch (1965); Savas (1977); Ochrana et al.(2007); Mikusova-Merickova and Nemecek (2013)
Density or Housing density	Hirsch (1965); Stevens (1978); Domberger et al. (1986); Reeves and Barrow (2000); Callan and

	Thomas (2001); Dijkgraaf and Gradus (2003); Ohlsson (2003); Bel and Costas (2006); Dijkgraaf and Gradus (2007); Dijkgraaf and Gradus (2013)
State of technology and productivity	Hirsch (1965); Lombrano (2009)
Frequency	Hirsch (1965); Stevens (1978); Domberger et al. (1986); Bello and Szymanski (1996); Szymanski (1996); Reeves and Barrow (2000); Callan and Thomas (2001); Ohlsson (2003); Dijkgraaf and Gradus (2003); Bel and Costas (2006); Dijkgraaf and Gradus (2007)
Political influence	Hirsch (1965) ¹ ; Gómez-Lobo and Szymanski (2001); Dijkgraaf and Gradus (2013); Sičáková-Beblavá and Beblavý (2007)
Recycling	Goddard (1995); Reeves and Barrow (2000); Callan and Thomas (2001); Fiorucci et al. (2003); Bel and Costas (2006); Lombrano (2009); Larsen et al. (2010); Passarini et al. (2011); Beigl and Salhofer (2004)
Competition	Savas (1977); Stevens (1978); Dijkgraaf and Gradus (2006); Warner and Bel (2008); Bel; Fageda and Warner (2010); Bel and Fageda (2011); Bel et al. (2013); Soukopová and Malý (2013)
Form of company ownership (private/public)	Hirsch (1965); Savas (1977); Stevens (1978); McDavid (1985); Domberger et al. (1986); Bello and Szymanski (1996); Szymanski (1996); Reeves and Barrow (2000); Callan and Thomas (2001); Dijkgraaf and Gradus (2003); Ohlsson (2003); Bel and Costas (2006); Dijkgraaf and Gradus (2007); Pavel (2007); Pavel (2007); Warner and Bel

	(2008); Bel; Fageda and Warner (2010); Bel and Fageda (2010); Bel; Fageda and Mur (2013); Dijkgraaf and Gradus (2013); Gradus et al. (2014)
Effects of economies of scale	Savas (1977); Dijkgraaf and Gradus (2007); Bel and Warner (2014)
Inter-municipal cooperation	Bel and Costas (2006); Bel; Fageda and Mur (2013); Bel and Warner (2014); Dijkgraaf and Gradus (2013); Gradus et al. (2014)
Distance to landfill (incinerator)	Callan and Thomas (2001); Ohlsson (2003), Beigl et al. (2008), Soukopová and Struk (2012)

Source: Authors

Most of the papers in Table 1 focused especially on the form of ownership of waste management companies, as well as their contracting activities and performance. There is also a lot of solid new evidence that competition and contracting are among the most significant factors influencing efficiency (e.g. Ohlsson, 2003; Rathi, 2006; Warner and Bel, 2008; Bel, Fageda and Warner, 2010; Bel, Fageda and Mur, 2013; Dijkgraaf and Gradus, 2013; Gradus et al., 2014).

Even if the relevance of the examined issue is high on international research agendas, research in the Czech Republic remains scarce (Nemec et al., 2005; Ochrana et al., 2007, Soukopová and Struk, 2011; Slavík, 2012; Nemec et al., 2012; Soukopová and Malý, 2013). Slavík (2012) reported that both forms of ownership have their advantages and disadvantages in the conditions of the Czech Republic. Ochrana et al. (2007) have carried out research which was aimed at ensuring the effectiveness of selected public services by analyzing factors influencing the effectiveness of organizational forms providing public services. The findings of this research show that *“providing quality public services depends significantly on a systemic approach to the provision of public services. Selection of the appropriate method of securing public services depends on the type of public service as well as the conditions under which this service is provided.”* (Ochrana et al., 2007: 140).

These papers state that it is necessary to research factors influencing the selection of a waste management company by municipalities. This is one of the main reasons why factors influencing the selection of a waste management company are the subject of the first research question and the public and private ownership of waste management companies and competition as the main factors defined by international research are dealt with in the second research question investigated in this paper.

3. Materials and methods

Data was obtained via an electronic questionnaire-based survey, which included a representative sample of municipalities in the Czech Republic. The survey was carried out from November 2013 to the end of January 2014, with the questionnaire repeatedly being sent to 1,888 randomly-selected municipalities.

The survey was carried out in 4 regions. The sample included 910 municipalities in the Central Bohemia Region, 359 municipalities in the Pardubice Region, 374 municipalities in the Hradec Králové Region and 245 municipalities in the Moravian-Silesian Region. Data was obtained via an electronic questionnaire. Communication with representatives of municipal authorities is often associated with the reluctance of questionnaire recipients to cooperate. Expectations regarding a low response rate were justified. In the end, only 215 properly completed questionnaires could be used.

Tab. 2 shows numbers of municipalities by population size in the Czech Republic and in the data sample.

Tab. 2 Data sample (grouped by population size)

Population size	Number of municipalities					
	Czech Republic		Sample*		Sample**	
less than 199	1,455	23.3%	439	23.3%	27	12.6%
200 ... 499	2,001	32.0%	604	32.0%	63	29.3%
500 ... 999	1,369	21.9%	413	21.9%	46	21.4%
1,000 ... 4,999	1,157	18.5%	350	18.5%	57	26.5%

5,000 ... 9,999	140	2.2%	42	2.2%	10	4.6%
10,000 ... 19,999	68	1.1%	21	1.1%	7	3.3%
20,000 ... 49,999	43	0.7%	13	0.7%	3	1.4%
more than 50,000	20	0.3%	6	0.3%	2	0.9%
Total	6,253	100.0%	1,888	100.0%	215	100.0%

Note:

* sample of 1,888 approached municipalities

** sample of 115 municipalities which provided data

Source: Authors: data obtained from the Czech Statistical Office

Further information was acquired from the waste management companies SITA, a. s., RESPONO, a. s. and van Gansewinkel, a. s.

Based on the analysis of foreign literature and discussions with representatives of municipalities and waste collection companies we selected the following twelve factors for examination:

1. price;
2. frequency of services;
3. capacity of transport (capacity of waste collection vehicles);
4. quality of services;
5. political influence;
6. previous experience;
7. ownership of an incinerator or landfill;
8. conditions of contract (contract termination options, contractual penalties, etc.);
9. technical equipment of company;
10. form of company ownership;
11. provision of other waste management services (operation of waste yard, etc.);
12. form of payment for services.

For the assessment of the impact of selected factors we chose the following point scale: 1 – not important at all, 2 – unimportant, 3 – important, 4 – very important¹.

We then divided up the data primarily according to the type of ownership of waste collection companies (private and public). In this paper, public waste management companies are considered to be companies in which municipalities have a majority share of at least 50%, while waste management companies which have a mixture of owners (less than 50% are public owners) or whose owners are only private are classified as private waste management companies.

In the other part of this research, the strength of the factors was researched separately, and another line of research concerned a set of municipalities with contractual connections with private waste collecting companies and a second set of municipalities with contractual connections with public waste collecting companies. After creating two groups based on company ownership, we performed a statistical analysis and compared data concerning the point scale average, median, standard deviation and coefficient of variation.

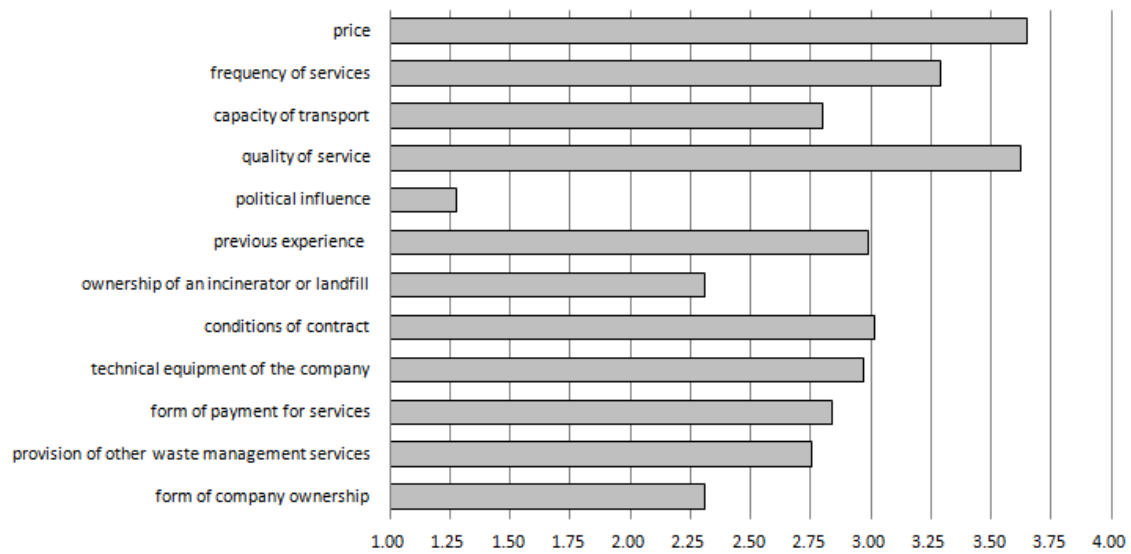
4. Results and discussion

4.1 Factors influencing the choice of waste collection companies

The results of the analysis of the factors influencing the selection of waste management companies by selected municipalities in the Czech Republic are shown in Fig. 1 and Tab. 3.

¹ This point scale we used based on the assumption that representatives who answered the survey are responsible to decision-making in the area of waste management. Therefore in the survey is not answer I don't know.

Fig. 1 The importance of the selected factors that influence the selection of waste collection companies



Source: authors

Tab. 3 The importance of the selected factors that influence the selection of waste collection companies

Rank	Selected factors	mean	median	standard deviation	coefficient of variation
1.	price	3.65	4	0.52	0.14
2.	quality of service	3.62	4	0.55	0.15
3.	frequency of services	3.29	3	0.55	0.17
4.	conditions of contract	3.01	3	0.77	0.26
5.	previous experience	2.99	3	0.73	0.24
6.	technical equipment of the company	2.97	3	0.69	0.23
7.	form of payment for services	2.84	3	0.71	0.25
8.	capacity of transport	2.80	3	0.70	0.25
9.	provision of other waste management services	2.75	3	0.78	0.28

10.	form of company ownership	2.31	2	0.87	0.38
11.	ownership of an incinerator or landfill	2.31	2	0.89	0.39
12.	political influence	1.27	1	0.57	0.45

Source: Authors

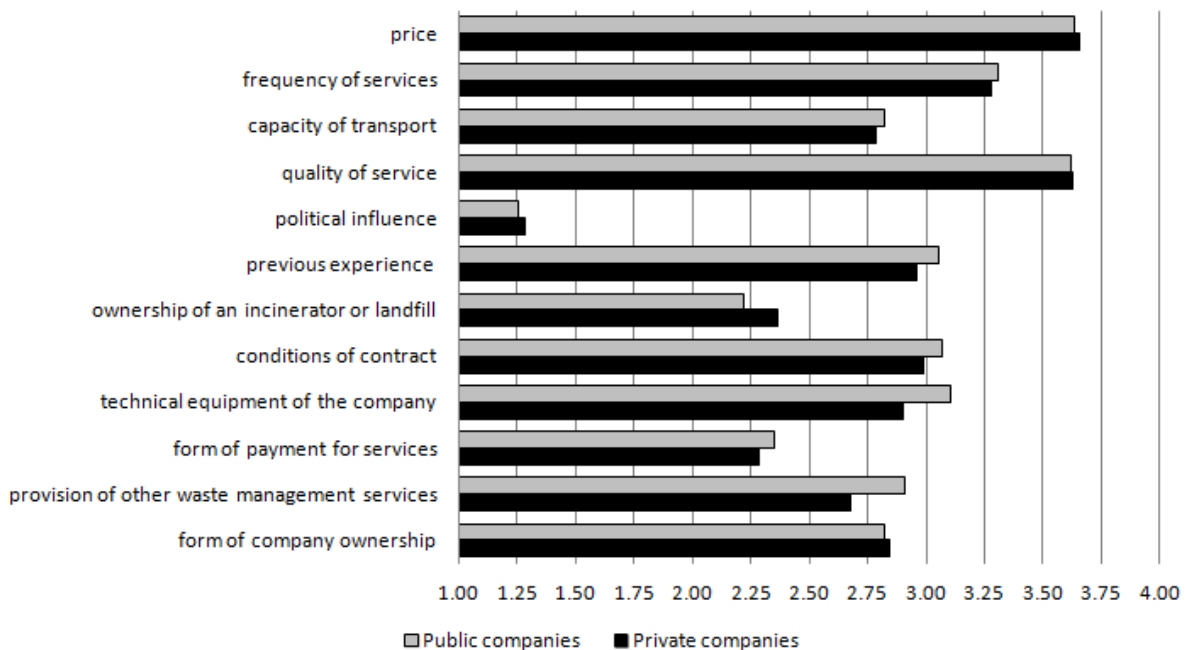
The most important factors are *price*, *quality of service* and the *frequency of services*. There are also other important factors: *technical equipment of the company*, *conditions of contract* and *previous experience*. Factors which were described as being of medium importance are: *form of payment for services*, *capacity of transport* and *provision of other WM services*. The factor concerning *ownership of an incinerator or landfill* was unimportant for representatives of municipalities. However, this factor has a higher standard deviation. The last factor, *political influence*, is of negligible importance to municipal representatives.

4.2 Ownership of waste collection company as the factor influencing the decision making process

If we focus on the form of waste management company ownership, we can see that private waste collecting companies strongly dominate in the collected data. There are 141 private companies and only 74 public companies. The dominant share of the private companies is not limited only to the regions involved in the survey. This fact demonstrates the superior position of the private sector in waste management in the Czech Republic, which is confirmed by the results of research by Soukopová and Struk (2012), Soukopová and Malý (2012, 2013), and Mikušová-Meričková and Nemeč (2013).

The results of the analysis of the importance of the selected factors that influenced the selection of waste collection companies displayed according to company ownership type are shown in Fig. 2.

Fig. 2 The importance of the selected factors that influence the selection of waste collection companies



Source: Authors

Fig. 2 shows the importance of the selected factors that influence the selection of waste collection companies. The values on the graph represent the average of all the values obtained from the questionnaires for each factor rated on a scale from 1(not important) to 4 (important). The red columns show the results in municipalities where the collection and transport of municipal waste is provided by public companies, while the blue ones are from where such services are provided by private companies.

Again, the most important factors are *price*, *quality of service* and *frequency of services*. Comparison of significance factors between private and public companies indicates very similar results, especially for the factors *price*, *quality of service* and *frequency of services*, and for the factor *political influence*, which was also consistently ranked as the least important factor for both types of companies. More significant differences can be seen for ranks 6. – 11, see Tab. 4.

The most significant difference in the perception of the importance of the factors includes: the *technical equipment of the company*, the *provision of other waste management services*, and the *form of payment for services*.

Tab. 4 The importance of the selected factors that influence the selection of private waste collection companies

selected factors	private waste collection companies			public waste collection companies		
	rank	mean	standard deviation	rank	mean	standard deviation
price	1.	3.66	0.54	1.	3.64	0.48
frequency of services	3.	3.28	0.53	3.	3.31	0.59
capacity of transport	8.	2.79	0.73	8.	2.82	0.64
quality of service	2.	3.62	0.54	2.	3.62	0.56
political influence	12.	1.28	0.56	12.	1.26	0.57
previous experience	5.	2.96	0.74	6.	3.05	0.70
ownership of an incinerator or landfill	10.	2.36	0.88	11.	2.22	0.92
conditions of contract	4.	2.99	0.75	5.	3.07	0.79
technical equipment of the company	6.	2.90	0.69	4.	3.11	0.67
form of company ownership	11.	2.28	0.84	10.	2.35	0.91
provision of other waste management services	9.	2.67	0.78	7.	2.91	0.76
form of payment for services	7.	2.84	0.72	9.	2.82	0.70

Source: Authors

The factors connected with service quality, such as the *technical equipment of the company* and the *provision of other waste management services*, are more important for municipalities where public waste management companies provide their services. In contrast, the strictly economic factor of the *form of payment for services* was more important for municipalities where private waste management companies operate.

4.3 Strength of the competitive environment as the factor influencing the decision making process

If we focus on the competition and on the strength of the competitive environment influencing the decision-making process then we can state that the strength of competition can be assessed in 65% of cases as medium strong, in 28% of cases as weak and only in 6% of cases as strong, see Tab. 5.

Tab. 5 Strength of the competitive environment

Form of company ownership	Number of municipalities	Strength of the competitive environment		
		0 or 1 WCC ²	2 or 3 WCC	≥ 4 WCC
private companies	65.60%	30.50%	63.12%	6.38%
public companies	34.40%	22.97%	70.27%	6.76%
total	100.00%	27.91%	66.05%	6.51%

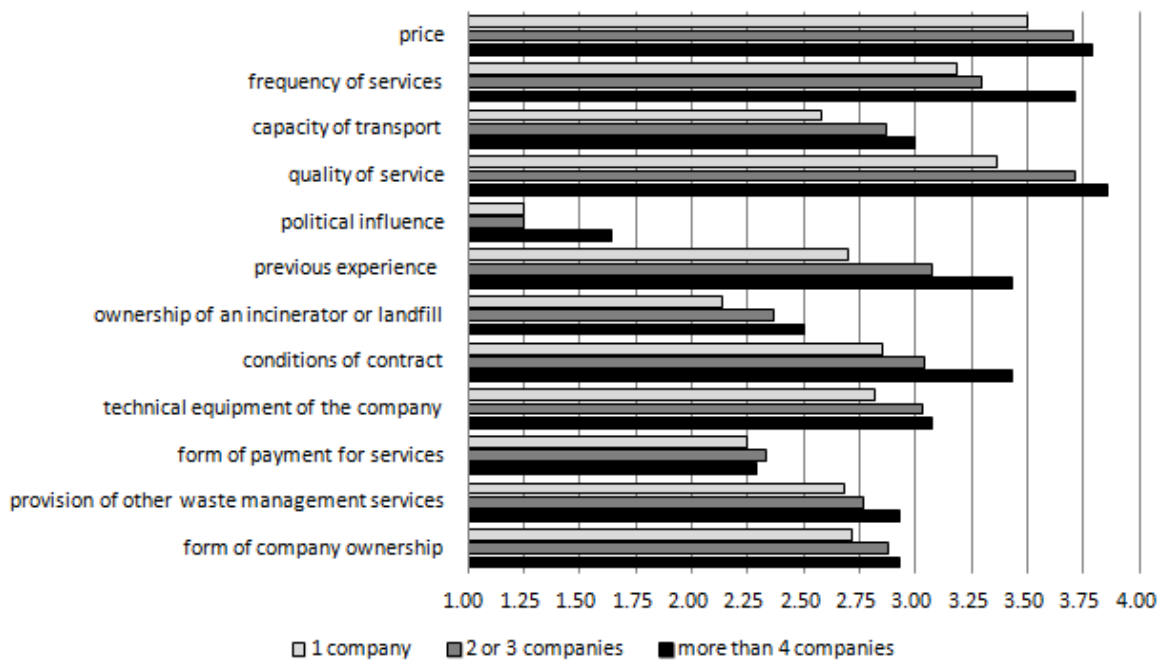
Source: Authors

It is interesting that a weak competitive environment prevails in the municipalities where private companies operate, while a medium strong competitive environment prevails in the municipalities where public waste collecting companies provide their services. Although this relationship is not very strong, it can be seen that the intensity of competition increases simultaneously with the increasing involvement of public companies,

In Fig. 3 it is shown that the competitive environment is of obvious importance in the decision making process. Results and ranking factors are different depending on the strength of the competitive environment, see Tab. 6. In the case of municipalities in which there is a strong competitive environment (i.e. where more than 4 companies operate), the *quality of services* is more important for municipal representatives than *price*. They also take into account factors such as *previous experience* and *conditions of contract*.

² WCC – waste collection company

Fig. 3 The importance of the selected factors that influenced the selection of waste collection companies



Source: Authors

Tab. 6 The importance of the selected factors that influence the selection of private waste collection companies

Selected factors	Rank			Mean		
	0 or 1	2 or 3	≥4	0 or 1	2 or 3	≥4
	WCC	WCC	WCC	WCC	WCC	WCC
price	1.	2.	2.	3.50	3.70	3.79
frequency of services	3.	3.	3.	3.18	3.29	3.71
capacity of transport	9.	8.	7.	2.58	2.87	3.00
quality of service	2.	1.	1.	3.37	3.71	3.86
political influence	12.	12.	12.	1.25	1.25	1.64
previous experience	7.	4.	4. – 5.	2.70	3.07	3.43
ownership of an incinerator or landfill	11.	10.	10.	2.13	2.37	2.50

conditions of contract	4.	5.	4. – 5.	2.85	3.04	3.43
technical equipment of the company	5.	6.	6.	2.82	3.03	3.07
form of company ownership	10.	11.	11.	2.25	2.33	2.29
provision of other waste management services	8.	9.	8. – 9.	2.68	2.77	2.93
form of payment for services	6.	7.	8. – 9.	2.72	2.88	2.93

Source: Authors

The strength of the competitive environment is strongly connected with the growing role of almost all factors. On the other hand, an interesting fact is that there is a decline in the importance of the *form of company ownership* in the municipalities where more than 4 waste management companies operate.

4.4 Discussion

As regards the importance of individual factors, this paper proves that the factors *price* and *quality of service* are the most important. These two factors have a median of 4 and thus can be evaluated as very important. The selection of these factors confirms the rational behavior of municipal representatives while answering the survey questions.

It is interesting that the role of certain factors is not paid sufficient attention in the context international research (Hirsch, 1965; Savas, 1977; Ochrana et al., 2007; Mikušová-Meričková and Nemeč, 2013; Soukopová and Malý, 2013), such as competition, mode of provision, conditions of contract, and *form of company ownership* (see Tab. 1).

The ranking of the factor *frequency of services* shows how important this factor is for the decision-making process. This factor is considered one of the key factors for use when researching effectiveness, and not only by municipal representatives, but also by a number of studies (Hirsch, 1965; Stevens, 1978; Domberger et al., 1986; Szymanski, 1996; Reeves and Barrow, 2000; Callan and Thomas, 2001; Ohlsson, 2003; Dijkgraaf and Gradus, 2003; Bel and Costas, 2006, and Dijkgraaf and Gradus, 2007).

It is interesting that factors such as the *form of company ownership* and the *ownership of an incinerator or landfill* don't play an essential role in the decision-making process. The median of these two factors is 2, and most municipal representatives deemed these factors unimportant. A particularly interesting factor is the *form of company ownership*, which, according to a large amount of research, has an influence on the cost efficiency of municipal waste management (Hirsch, 1965; Savas, 1977; Stevens, 1978; McDavid, 1985; Domberger et al., 1986; Szymanski, 1996; Reeves and Barrow, 2000; Callan and Thomas, 2001; Dijkgraaf and Gradus, 2003; Ohlsson, 2003; Bel and Costas, 2006; Dijkgraaf and Gradus, 2007; Pavel, 2007; Warner and Bel, 2008; Bel, Fageda and Warner, 2010; Bel and Fageda, 2010; Bel, Fageda and Mur, 2013; Dijkgraaf and Gradus, 2013; Gradus et al., 2014).

However, the results presented in the above studies are often different. Most of the results from research in Canada (McDavid, 1985), England and Wales (Szymanski and Wilkins, 1993; Szymanski, 1996), Ireland (Reeves and Barrow, 2000) and Spain (Bel and Warner, 2008) suggest municipal expenditure savings will be achieved if a private company carries out refuse collection services. Other results from research in the USA (Stevens, 1978), the Netherlands (Dijkgraaf and Gradus, 2003; Dijkgraaf and Gradus, 2007) and Spain (Bel, Fageda and Warner, 2010; Bel and Fageda, 2011) show that there is no significant difference between public and private companies. In contrast to the aforementioned research, Ohlsson (2003) indicated that public production is cheaper than private in Sweden.

If we think about the factor *form of company ownership* and the rationality of municipal representatives during the decision-making process, we cannot draw any conclusions because the results are ambiguous. Cullis and Jones (1987, p. 169) argue that the level of competitiveness, not ownership, is the most important determinant of performance.

This is the reason why we have focused on the following question in the next part of this paper: Are there any differences in the significance of these factors from the perspective of the form of provision (public and private companies) and strength of competition?

The analysis results confirm previous results in relation to the factor *form of company ownership* where the perception of the importance of individual factors is not too different.

Interestingly, however, the analysis of the impact of the competitive environment shows that competition can affect other results, especially in the case of an intensely competitive environment (with 4 or more companies), where *quality of service* is more important than *price* for municipal representatives.

Also, the factor *previous experience* becomes more important in a competitive environment. This factor is not mentioned in international studies, but it is very important in post-communist economies such as the Czech Republic or Slovakia (Pavel, 2007; Soukopová and Malý, 2013; Mikušová-Meričková and Nemeč, 2014). It can probably induce positive effects if it is connected with *quality of service*, waste management company behavior and other factors. However, it can point to the existence of some form of cronyism in public contracts (Pavel, 2007, Pavel and Ochrana, 2013).

5. Conclusion

The objective of the paper was to analyse the factors influencing the choice of waste management company and the influence of these factors on the decision making process, and discuss the relation of these factors to the cost efficiency of municipal waste management with a focus on the competition and form of ownership of waste management companies on the decision making process.

The analysis results bring up interesting questions. If we think about the importance of factors influencing the choice of waste management company, then from the perspective of the rationality of municipal representatives the most important factors that were chosen were *price* and *quality of service*, while the unimportant factors were *form of company ownership* and *ownership of an incinerator or landfill*, the most unimportant factor of all being *political influence*. Other factors were considered important. Outside the factors which in foreign research were seen as affecting the efficiency of spending on waste management, the most interesting result is the factor *form of company ownership*.

However, the objective of this case study was not to demonstrate which companies (private or public) are more suitable for lowering municipal expenditure. The main objective was to determine which factors are important for municipal representatives when selecting a waste collecting company, and what the role of those factors is in terms of measuring effectiveness. It has been shown that municipal representatives do not have appreciably different requirements from public companies and private companies. From this point of view, conformity can be found with studies that did not point to significant differences between private or public companies. On the other hand, it was demonstrated that strength of competition significantly affects the importance of the factors.

It can be assumed that the agreement on the importance of selected factors in the selection of waste collection companies is caused by the uniform requirements of municipal representatives. However, a more significant conclusion might be the confirmation of the fact that no differences are perceived between private and public service providers by municipal representatives.

It is clear that the real factors determining the involvement of collection companies have to cover the specific conditions and requirements of each specific municipality.

In this case study, several factors of varying strength that influence the selection of waste collection companies in municipalities in the Czech Republic have been covered. It was also clearly shown that the significance of individual factors is related to the competitive environment. The level of significance of individual factors is directly proportional to the strength of the competitive environment.

These facts suggest that this is an area with interesting potential for further research.

We realize that this analysis does not cover all the factors with an impact on efficiency that could be included, but we wanted to look at the issue of the factors influencing the choice of waste management company from a different perspective in order to perform a comprehensive analysis of the cost-effectiveness of waste management using advanced statistical and mathematical methods.

6. References

- BEIGL, Peter, LEBERSORGER, Sandra and SALHOFER, Stefan, 2008 Modelling municipal solid waste generation: A review. *Waste management*, **28**(1), 200-214.
- BEIGL, Peter and SALHOFER, Stefan, 2004. Comparison of ecological effects and costs of communal waste management systems. *Resources, Conservation and Recycling*, **41**(2), 83-102.
- BEL, Germà and COSTAS, Antón, 2006. Do public sector reforms get rusty? Local privatization in Spain. *Journal of Policy Reform*, **9**(1), 1-24.
- BEL, Germà and FAGEDA, Xavier, 2011. Big guys eat big cakes: firm size and contracting in urban and rural areas. *International Public Management Journal*, **14**(1), 4-26.
- BEL, Germà, FAGEDA, Xavier and MUR, Melania, 2013. Why do municipalities cooperate to provide local public services? An empirical analysis. *Local Government Studies*, **39**(3), 435-454.
- BEL, Germà, FAGEDA, Xavier and WARNER, Mildred E., 2010. Is private production of public services cheaper than public production? A meta-regression analysis of solid waste and water services. *Journal of Policy Analysis and Management*, **29**(3), 553-577.
- BEL, Germà and MUR, Melania, 2009. Intermunicipal cooperation, privatization and waste management costs: Evidence from rural municipalities. *Waste Management*, **29**(10), 2772-2778.
- BEL, Germà and WARNER, Mildred, 2008. Does privatization of solid waste and water services reduce costs? A review of empirical studies. *Resources, Conservation and Recycling*, **52**(12), 1337-1348.
- BELLO, Hakeem and SZYMANSKI, Stefan, 1996. Compulsory competitive tendering for public services in the UK: the case of refuse collection. *Journal of Business Finance & Accounting*, **23**(5-6), 881-903.
- BOYNE, George A., 2003. What is public service improvement? *Public Administration*, **81**, No. 2, 211-227.

- CALLAN, Scott J. and THOMAS, Janet M., 2001. Economies of scale and scope: A cost analysis of municipal solid waste services. *Land Economics*, **77**(4), 548-560.
- DIJKGRAAF, Elbert and GRADUS, Raymond H., 2003. Cost savings of contracting out refuse collection. *Empirica*, **30**(2), 149-161.
- DIJKGRAAF, Elbert and GRADUS, Raymond H., 2007. Collusion in the Dutch waste collection market. *Local Government Studies*, **33**(4), 573-588
- DIJKGRAAF, Elbert and GRADUS, Raymond H., 2013. Cost advantage cooperations larger than private waste collectors. *Applied Economics Letters*, **20**(7), 702-705
- DOMBERGER, Simon, MEADOWCROFT, Shirley A. and THOMPSON, David J., 1986. Competitive tendering and efficiency: the case of refuse collection. *Fiscal Studies*, **7**(4), 69-87.
- DUBIN, Jeffrey A. and NAVARRO, Peter, 1988. How markets for impure public goods organize: the case of household refuse collection. *Journal of Law, Economics, and Organization*, **4**(2), 217-241.
- FIORUCCI, Paolo, et al., 2003. Solid waste management in urban areas: development and application of a decision support system. *Resources, conservation and recycling*, **37**(4), 301-328.
- GODDARD, Haynes C., 1995. The benefits and costs of alternative solid waste management policies. *Resources, Conservation and Recycling*, **13**(3), 183-213.
- GÓMEZ-LOBO, Andres and SZYMANSKI, Stefan, 2001. A law of large numbers: bidding and compulsory competitive tendering for refuse collection contracts. *Review of Industrial Organization*, **18**(1), 105-113.
- GRADUS, Raymond; DIJKGRAAF, Elbert; WASSENAAR, Mattheus, 2014. Understanding Mixed Forms of Refuse Collection, Privatization, and Its Reverse in the Netherlands. *International Public Management Journal*, **17**(3), 328-343.
- HIRSCH, Werner Z., 1965. Cost functions of an urban government service: refuse collection. *The Review of Economics and Statistics*, **47**(1), 87-92.

- LARSEN, Anna Warberg, et al., 2010. Waste collection systems for recyclables: an environmental and economic assessment for the municipality of Aarhus (Denmark). *Waste Management*, **30**(5), 744-754.
- LOMBRANO, Alessandro, 2009. Cost efficiency in the management of solid urban waste. *Resources, Conservation and Recycling*, **53**(11), 601-611.
- MCDAVID, James C., 1985. The Canadian experience with privatizing residential solid waste collection services. *Public Administration Review*, **45**(5), 602-608.
- MIKUSOVA MERICKOVA, Beata and NEMEC, Juraj, 2013. Factors determining the success of contracting local public services: Waste collection and waste disposal, management of cemeteries in Slovakia, *Lex Localis*, **11**(3), 375-386
- MIKUŠOVÁ-MERIČKOVÁ, Beata and VOZÁROVÁ, Zuzana, 2012. Determinaty prínosu outsourcovania služieb vo verejnom sektore. *E+ M Ekonomie a Management/E+ M Economics & Management*, **2012**(3), 63-75.
- NEMEC, Juraj, MERICKOVA, Beata and VITEK, Leos. 2005. Contracting-out at Local Government Level: Theory and Selected Evidence from Czech and Slovak Republics, *Public Management Review*, **7**(4), 638-647.
- NEMEC, Juraj, MIKUŠOVÁ-MERIČKOVÁ, Beata and VOZÁROVÁ, Zuzana, 2012. Management of Contracting Public Services and its Quality in Slovakia. *NISPAcee Journal of Public Administration and Policy*, **5**(1), 55-74.
- OHLSSON, Henry, 2003. Ownership and Production Costs: Choosing between Public Production and Contracting-Out in the Case of Swedish Refuse Collection. *Fiscal Studies*, **24**(4), 451-476.
- OCHRANA, František et al., 2007. *Efektivnost zabezpečování vybraných veřejných služeb na úrovni obcí*, Praha: Nakladatelství VŠE.
- PASSARINI, Fabrizio, et al., 2011. Indicators of waste management efficiency related to different territorial conditions. *Waste management*, **31**(4), 785-792.
- PAVEL, Jan, 2007. Efektivnost obecních obchodních společností při poskytování služeb. *Politická ekonomie*, **55**(5), 681-693.

- PAVEL, Jan and OCHRANA, František, 2013. Analysis of the Impact of Transparency, Corruption, Openness in Competition and Tender Procedures on Public Procurement in the Czech Republic. *Central European Journal of Public Policy*, **7**(2), 114-134.
- PRIETO, Angel M. and ZOFÍO, José L., 2001. Evaluating effectiveness in public provision of infrastructure and equipment: the case of Spanish municipalities. *Journal of Productivity Analysis*, **15**(1), 41-58.
- REEVES, Eoin and BARROW Michael, 2000. The impact of contracting-out on the costs of refuse collection services. The case of Ireland. *Economic and Social Review*, **31**(2), 129-150.
- SAVAS, Emanuel S., 1977. An empirical study of competition in municipal service delivery. *Public Administration Review*, **37**(6), 717-724.
- SIČÁKOVÁ-BEBLAVÁ, Emília and BEBLAVÝ, Miroslav, 2007. Faktory ovplyvňujúce rozhodovanie o spôsobe zabezpečovania služieb vo veľkých slovenských mestách. *Politická ekonomie*, **55**(2), 245-261.
- SLAVIK, Jan and PAVEL, Jan, 2013. Do the variable charges really increase the effectiveness and economy of waste management? A case study of the Czech Republic. *Resources. Conservation and Recycling*, **70**(1), 68-77.
- SOUKOPOVÁ, Jana and MALÝ, Ivan, 2013. Competitive environment in waste management and its impact on municipal expenditures. *Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis*, **61**(4), 173-183.
- SOUKOPOVÁ, Jana and STRUK, Michal, 2011. Methodology for the Efficiency Evaluation of the Municipal Environmental Protection Expenditure. *IFIP Advances in Information and Communication Technology*; **359**, 327-340.
- STEVENS, Barbara J. 1977. Scale, market structure, and the cost of refuse collection. *Review of Economics and Statistics*, **60**(3), 438-448.
- SZYMANSKI, Stefan, 1996. The Impact of Compulsory Competitive Tendering on Refuse Collection Services. *Fiscal Studies*, **17**(3), 1-19.

SZYMANSKI, Stefan and WILKINS, Sean, 1993. Cheap rubbish? Competitive tendering and contracting out in refuse collection—1981–88. *Fiscal Studies*, **14**(3), 109-130.

VEIGA, Linda Gonçalves; and VEIGA, Francisco José, 2007. Political business cycles at the municipal level. *Public Choice*, **131**(1-2), 45-64.

WILSON, David C., et al. 2012. Comparative analysis of solid waste management in 20 cities. *Waste Management and Research*, **30**(3), 237-254.