Miloš Poliak [*]
Štefánia Semanová [**]
Adela Poliaková [***]

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Preliminary statement

RISK ALLOCATION IN TRANSPORT PUBLIC SERVICE CONTRACTS

The aim of this paper is to analyse the risks that are the subject of public service contracts for providing public passenger services and to express their impact on financing transport services from the position of public authorities. The paper verifies a hypothesis that the most advantageous contract from the position of public authorities is a net cost contract. Under this contract type, public authorities take no risks related to providing transport services. The paper also analyses the risks that arise during transport service provision. The risks are divided into cost and revenue risks. The paper proposes a procedure for quantification of cost and revenue risks and it provides a model calculation in the conditions of the Slovak Republic. The paper also highlights the bottlenecks in the conclusion of individual contract types from the position of public authorities.

Key words: public transport, financing, risk, factor, region

[*] M. Poliak, Department of Road and Urban Transport, Faculty of Operation and Economics of Transport and communications, University of Žilina (E-mail: milos.poliak@fpedas.uniza.sk)

[**] Š. Semanová, Department of Road and Urban Transport, Faculty of Operation and Economics of Transport and communications, University of Žilina (E-mail: stefania.semanova@fpedas.uniza.sk)

[***] A. Poliaková, Faculty of Materials Science and Technology in Trnava, Slovak University of Technology in Bratislava (E-mail: adela.poliakova@stuba.sk)

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1. Introduction

According to Beck (2011), the majority of public passenger transport services cannot be provided on a commercial basis within Member States of the European Union. Public authorities must ensure transport service provision even in the time of low demand particularly in the evenings and at the weekends (Hensher and Stanley, 2003). According to Poliak et al. (2012), the aim of transport serviceability is to provide inhabitants with the satisfaction of their basic transport needs such as travelling to work, schools or health care facilities. Furthermore, Wallis et al. (2010) and Zhanbirov and Kenzhegulova (2012) noted that it is necessary to provide public transport services with regard to social and environmental factors. Thus, it is also necessary to provide special tariff conditions for particular groups of passengers such as pupils, students and pensioners who have no other options of transportation than public passenger transport. This requires the support of public passenger transport from public funds.

In 2007, Regulation (EC) No. 1370/2007 came into force and it is valid throughout the European Union (EU). It regulates the conditions of providing and financing public transport services in the EU Member States. According to this legislation, a direct award of public service contracts is possible in rail and road transport in the case of an internal operator (a public service operator is owned by a public authority). The direct award of the contracts is also possible if the following restrictions are observed. The first restriction is that the average annual value of public service contracts is estimated to be less than 1 000 000 € or the public service contracts concern the annual provision of less than 300 000 kilometres of public passenger transport services. According to the second restriction, the limit of 1 000 000 € increases up to 2 000 000 € per year and the limit of 300 000 kilometres increases up to 600 000 kilometres per year only in the case of the direct award of contracts to a small or medium-sized enterprise which does not operate more than 23 vehicles. In all other cases, public authorities are obligated to ensure transport service provision through a competitive tendering.

According to Poliak et al. (2014), the public authorities from Central Europe countries do not have enough experience with either public procurement of transport services or determination of the service operator's remuneration depending on the risk which is assumed by the operator. Despite the fact that Regulation (EC) No. 1370/2007 requires the remuneration which would depend on the level of risk-taking, Poliak (2013) pointed out that remuneration determined as percentage of the costs is often included in the existing public service contracts. For example, in Slovakia up to 2014, the reasonable profit of a service operator is determined in the range from 3.5 to 5.0 % of the economically justified costs (Kilianová, 2012, Semanová, 2014). In Hungary, the public service contract, concluded between the

operator and the public authority (Budapest city), contains provisions under which a level of the reasonable profit is a maximum of 4 % of economically justified costs[1]. On the other hand, in the Czech Republic, a new Decree No. 296/2010 was adopted in 2010[2] and it stipulates a level of the reasonable profit at maximum level of 7.5 % of operating assets per year.

There are public authorities that still do not take into account the risk assumed by a service operator when determining remuneration in Central Europe countries. Therefore, the aim of this paper is to analyse the risks related to public service provision. It is necessary to quantify the risk when determining remuneration depending on the risk.

The second section of the paper analyses the risks associated with the public transport service provision. The risks are classified and divided according to several aspects. The third section of the paper deals with the allocation of the risks between contractual parties in public passenger transport – the public authority and service operator. It explains three different contract types depending on the risk allocation. As the authors of the paper did not find a methodology from available resources for risk quantification in public service contracts, they have proposed their own methodology in the fourth section. The methodology is applicable in determining operator's remuneration.

A contract under which an operator assumes all the risks (cost risks as well as revenue risks) may appear to be the most advantageous from the position of public authorities. The contract is called a net cost contract. The authors of the paper deal with a mathematical model of the operators' approach when assuming cost and revenue risks. The model is derived from microeconomic theory. The paper verifies the hypothesis that a net cost contract is the most advantageous from the position of public authorities.

2. Analysis of the Risks Affecting the Financing of Public Passenger Transport

Risks arising from business as well as provision of public transport services can be classified according to various aspects. According to Valach (2001), the risks can be classified as systematic risks and non-systematic risks. The systematic risks include political risks (government policy changes), economic risks (changes

[1] City bus service contract between the operator of BKV and the city of Budapest, 2008

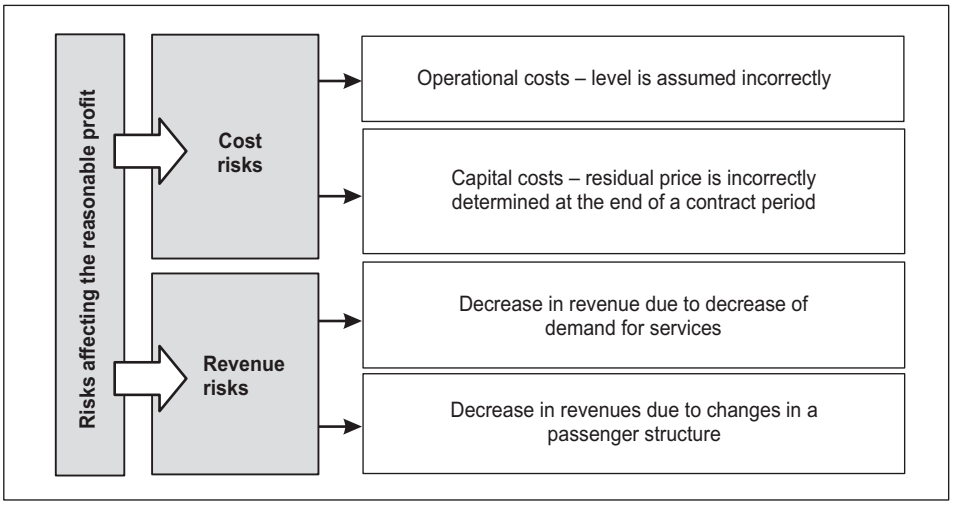
[2] Decree No 296/2010 Coll. on procedures for compiling the financial model and determining the maximum amount of compensation (CZ)

in prices, spending power of the population), changes in interest rates, and etc. The non-systematic risks are associated with the revenue of an enterprise and its ability to settle obligations. Dubovická, Varcholová (2008) distinguish risks according to the factors which cause those risks such as: technical risks, operational risks, financial risks, and policy risks.

Also, several other authors deal with the risks and their distribution between a service operator and public authority, e. g. Stanley and van de Velde (2008), Hensher and Stanley (2003) and van de Velde et al. (2008a). In authors' opinion, division of the risks into two groups, cost and revenue risks, is most advantageous for formation of public service contracts (Figure 1).

Figure 1

CLASSIFICATION OF THE RISKS AFFECTING THE REASONABLE PROFIT



Source: Stanley and van de Velde (2008a)

2.1. Cost Risks

Cost risks are related to the cost calculation when concluding public service contracts. According to Hensher and Stanley (2003), it is necessary to agree on the

price for performance realization in public service contracts. The price consists of the costs and profit of the service operator. When service operators assume cost risks, it is necessary to determine a range of performance that should be realized during the contract period and economically justified costs per unit of the performance in public service contracts. The cost risks can be divided by van de Velde et al. (2008b) into two groups: operational risks and residual value risks.

Operational cost risks are the risks that are related to the difference of the expected costs and the actually observed costs after performance realization. The reasonable profit must depend on the allocation of these risks. When the operator does not assume these risks and after realization of performance he proves eligibility of the costs to the public authority for the purpose of compensation, the operator takes no cost risk for the performance realization. According to Lalive and Schmutzler (2008a), in the case that the agreed unit costs in a public service contract are final, the operator assumes the cost risk and this should be reflected in appropriate level of the reasonable profit. Van de Velde et al. (2008b) divides the operational cost risks into external and internal operational cost risks. External operational cost risks are the risks that cannot be influenced by the operator at all (e.g. costs increasing due to flooding streets in the event of natural disasters). Internal operational cost risks are the risks that can be influenced by the operator, e.g. the costs of maintaining of a vehicle fleet (the operator can decide on the maintenance process in order to avoid failures of vehicles and higher costs).

Residual value risks are the risks that are related to the difference of the anticipated life of the fixed assets of the operator (Stanley and van de Velde, 2008). While providing public passenger transport it is primarily the means of transport and infrastructure (e.g. bus and tram stops, tram tracks, and etc.). The reasonable profit must depend on which party assumes the risk of the difference of the actual net book value of fixed assets at the end of the contract period and the anticipated net book value at the beginning of the contract period.

2.2. Revenue Risks

Revenue risks are associated with the difference between the expected revenue and the revenue actually achieved at the end of the contract period. In the case of revenue risks, it is possible to define influence of public authorities on revenue risks. According to Stanley and van de Velde (2008), these risks can be divided into two groups: demand risk and social policy risk.

Demand risk is the risk related to the changes in number of passengers carried when providing public passenger transport. In the case that the authority as-

sumes the revenue risk, it is necessary to appropriately involve the operator in compliance with the required quality because the amount of the compensation in this case does not depend on the number of passengers carried (van de Velde et al., 2008a). For example in Slovakia, this risk is very significant because the demand for public passenger transport, expressed in passenger-kilometres (pskm), is decreasing annually in road and railway transport (Konečný, 2011). According to Poliak et al. (2014), the performance decreased of 48 % in bus service and the performance decreased of 13.4 % in railway transport in the period from 2000 to 2013. The development of number of carried passengers depends to some extent on the interventions of public authorities which can indirectly influence the number of passengers carried through a fulfilling their strategic objectives. The strategic objectives of public authorities can be divided by Stanley and van de Velde (2008) to economic (maximizing the effectiveness and efficiency of resource use), environmental (minimizing the impact of transportation in the served area), social (ensuring possibility of mobility for all people, particularly for vulnerable groups of passengers) and public (planning transport policy and other policies in a region).

The social policy risk is the risk of revenue changes because of changes in the passenger structure. For example, when the selected groups of passengers (students, pensioners) travel with special fares, an increase in the number of those passengers while keeping the total number of passengers, causes a decrease in total revenue for providing transport services. The good solution is setting an appropriate pricing policy of transport services. However, according to Gnap et al. (2006) it is important to monitor the impact of price changes on the demand which varies considerably for particular groups of passengers. Fares are regulated by public authorities that decide which specific groups of passengers will be entitled to the reduced fares; and therefore, the social policy risk can be also classified as the risk associated with the interventions of public authorities.

Based on the above analysis, it can be stated that the most passengers leaving a system of public passenger transport are those who have an option of other means of transport, mainly a passenger car. This group consists of the passengers travelling for full fare. According to Wallis et al. (2010) and Poliak (2013), pupils who usually do not have the option of travelling by a passenger car, and they are subjected to compulsory school attendance, remain as the users of public passenger transport. Similarly in case of pensioners, the transition to individual motoring is limited at present. Therefore, the need for increasing public funding can be expected because the current trend of increases in number of passengers travelling with special fares persists. These fares bring lower income for the operator in comparison with the full fares.

3. Risk Allocation between Contractual Parties and Its Impact on Public Passenger Transport Financing

According to Lalive, R., Schmutzler, A. (2008b), public authorities shall decide on risk-taking before concluding public service contracts. Van de Velde et al. (2008a) distinguish between three possible cases of risk allocation and their corresponding types of contracts which are used in Western Europe.

In the first case, the operator assumes no risk. Cost and revenue risks are assumed by the authority that pays the economically justified costs to the operator. Those costs are accounted at the end of the contract period. This means that the risk from the difference between anticipated and actual costs is assumed by the authority which assumes also the risk from the difference between anticipated and actual revenue. In this case, the level of the reasonable profit of the operator should relate only to the retain capital during providing transport services because he assumes no risk. According to van de Velde et al. (2008a), the contracts within which the operator assumes no risks are called management contracts.

In the second case, the operator assumes cost risks. The operator assumes the risk from the difference between anticipated and actual costs at the end of the contract period. The authority assumes the risk from the difference between anticipated and actual revenue. In this case, the reasonable profit must contain not only the retain capital but also the reward for assuming the cost risk. According to van de Velde et al. (2008a), the contracts within which the operator assumes only cost risks are called gross cost contracts.

In the third case, the operator assumes cost as well as revenue risks. In this case, the operator assumes the risk from the difference between anticipated and actual costs/revenue which are identified at the end of the contract period. The authority pays the operator a compensation which is agreed before the performance realization. This means that the authority assumes no risks. The reasonable profit must include the components related to the cost risks, revenue risks, and the retain capital. According to van de Velde et al. (2008a), the contracts within which the operator assumes both cost and revenue risks are called net cost contracts.

Table 1 provides examples of cities where public service operators assume no risks or only cost risks (revenue risks are assumed by public authorities) or they assume both revenue and cost risks.

The analysis of the risk allocation between the operator and authority in the selected regions of Great Britain, France, Norway, Sweden, Finland, Denmark, Netherlands, Italy, USA, Australia, and New Zealand shows that all the mentioned ways of the risk allocation can be found in practice (Hensher and Wallis, 2005).

Table 1

ALLOCATION OF COST OR REVENUE RISKS
TO PUBLIC SERVICE OPERATORS

Operators assume	**No risks**	Lyon, Dijon
	Cost risks	Krakow, Innsbruck, Rome, Dublin, Gifhorn, London, Oviedo, Elmshorn, Frankfurt, Halmstad, Munich, Stockholm, Warsaw
	Revenue and cost risks	Amsterdam, Barcelona, Brussels, Budapest, Gifhorn, London, Parla, Porto, Santiago, Trieste, Greenland, Haarlem, Manchester, Sondrio, Sundsvall, Wittenberg

Source: van de Velde et al., (2008a) and Poliak et al., (2012)

4. Proposal of Methodology for Risk Quantification

Based on the analysis of the available resources, it is possible to identify the risks and also identify the way how to allocate them between contracting parties. However, there is no methodology according to which it would be possible to quantify the risk which is assumed by an operator. Also, the recommendations of Regulation (EC) No. 1370/2007 require to pay the operator a compensation on the basis of risk-taking. But, there is no recommended methodology for risk quantification. According to Hensher and Wallis (2005), a general rule applies that the higher risk is taken by an operator, the higher compensation is paid to the operator. For this reason, the authors proposed their own risk quantifying methodology according to a share of the risk which is assumed by the operator (as presented in the previous chapter). The methodology is applicable in any Member State of the European Union, mainly in case of the direct award of public service contracts. The methodology is also applicable in case of public procurement of transport services because the public authority needs to assess the possibility of changing the level of risk-taking and corresponding financial remuneration for the operator. The proposed methodology gives public authorities necessary information.

In cases that the operator assumes no risks, all the risks associated with providing transport services are assumed only by the public authority. Therefore, the level of the reasonable profit should relate only to capital used by the operator when providing transport services. A reward for capital provided by the operator

should depend on the profitability level of capital invested in term deposits with guaranteed returns. The reasonable profit in management contracts is calculated according to the following formula:

$$P = CI \cdot Cp \tag{1}$$

where:

P – reasonable profit (€)

CI – capital invested by the operator in regard with providing transport services

C_p – capital profitability[3]

In case that the operator assumes cost risks, the level of the reasonable profit must consist of two parts: the reward for capital provided by the operator (the same as mentioned above) and the reward corresponding to the cost risks. The reasonable profit is possible to determine according to the following formula:

$$P = CI \cdot Cp + (\sum_{i=1}^{n} \sigma_{Ni}) \cdot Pf \tag{2}$$

where:

N_i – values of particular cost items of the operator in unit expression

σ_{Ni} – the risk of estimated value of a particular cost item in percentage expression from the value of the cost item

n – number of operator's cost items

i – a particular cost item of the operator

Pf – performance

It is necessary to define the way of risk determination of estimated values of individual cost items in relation to the reasonable profit. The risk can be calculated by using the relationship for determination of safety surcharge to net premiums. Principle of the safety surcharge is based on the fact that number of insurance events is a binomial variable which can be approximated by a normal one and the risk premium is chosen in the extent of the standard deviation σ (Cipra, 2006).

[3] Profitability is determined on the basis of treasury bond profitability (e.g. according to notice of Agency for management of debt and liquidity)

In case that the operator assumes cost and revenue risks, the level of the reasonable profit must consist of three parts: the reward for capital provided by the operator (mentioned above), the reward corresponding to the cost risk (mentioned above), and the reward corresponding to the revenue risk. The reasonable profit is possible to determine according to the following formula:

$$P = CI \cdot Cp + (\sum_{i=1}^{n} \sigma_{Ni}) \cdot Pf + (\sum_{j=1}^{m} \sigma_{Tj}) \cdot Pf \quad (3)$$

where:

j – a particular group of passengers with the same fare level

m – number of passenger groups which are different by fare level

T_j – estimated revenue from a particular passenger group in unit expression

σ_{Tj} – revenue risk of a particular passenger group expressed in percentages

Determination of the revenue risk is done by an analogous method such as in case of determination of the cost risk. The revenue risk is possible to determine at standard deviation level of an income change per individual groups of passengers in observed period.

By implementing the proposed methodology, the public authority is able to assess remuneration changes depending on the proportion of the risk transferred to the operator. This assessment can be done before concluding public service contracts. The methodology allows assessing the impact of transferring the chosen cost risks (e.g. changes in fuel prices) because it works with the individual cost items. This applies also in case of the revenue risk where each of the factors is assessed individually. The hypothesis is tested in the next chapter. The chapter processes a model of operator's behaviour when the operator assumes all the risks associated with transport service provision.

The proposal for risk allocation distinguishes only between cost and revenue risks associated with transport service provision. However, other risks also arise in contracting between public authorities and service operators. These risks exist in case of any other commercial contracts. For example, there is the risk of inflation or the risk associated with interest rate changes. Allocation of those risks between contracting parties must be solved in a public service contract.

5. Modelling of Operator's Approach when Assuming Cost and Revenue Risk

From the position of public authorities that plan funds for providing public transport services, the net cost contracts appear to be most advantageous. Under this contract form, all the risks, cost and revenue, are assumed by the operator. The authority pays the operator a financial amount that is fixed determined at the beginning of the contract period and it is stated in the contract. In this case, the public transport services in a certain area are provided only by the selected operator/operators through a license. The system of licenses ensures saving funds expended by the public authority in public transport provision because the system excludes other unlicensed operators from the market. This increases the utilization of provided transport services. Increasing utilization helps to increase revenue from providing transport services. This is associated with the reduced need for financial support from the public funds. Those operators have the option to set the level of fares because they also assume revenue risks. In the following mathematical model, the authors try to explain the operators' approach in case that they assumes all the risks. The authors verify the hypothesis that transferring all the risks to the operator is economically effective from the position of the authority. This method assumes lower costs of transport service provision or increase in the scope of transport services. Based on the analysis of the available resources, there are no authors who would specifically deal with the mathematical modelling of the risk in providing transport services. While processing the model, the authors of the paper used mathematical modelling of a price regulation and determination of a business reasonable profit in network industries, processed by Fendeková and Fendek (2010). The model is derived from microeconomic theory. The mathematical cost modelling applicable to providing public transport services can be also found in the studies of Zhanbirov and Kenzhegulova (2012) and Sharma and Swami (2012).

Under net cost contracts, the operators assume not only cost risk but also revenue risk related to transport service provision. The authority grants a license for providing public transport services to the operator that is then entitled to provide public transport services in a given area with the exclusion of other operators (during the license period). As follows from the analysis processed by van de Velde et al. (2008a), the net cost contracts are rarely awarded as route contracts because the operator determines a fare level and he becomes a monopoly for providing public transport services in a given area during the licence period. The following mathematical model defines a procedure of such operator in relation to providing transport services.

We assume that the operator is a company that aims to make a profit. Based on the license and the public service contract – the net cost contract, the operator

provides a range of transport services bounded by demand of *q*. We start from a general assumption, which is acceptable in any type of the market structure, the consumption of a product offered in the market is described by a price-demand function that expresses willingness of a consumer to buy *q* units of services provided at given price - *p*.

$$p = p(q) \tag{4}$$

Technological conditions of the operator are expressed through the real cost function:

$$n = n(q) \tag{5}$$

The equation presents the amount of minimum costs of *n* which are spent by a producer in the production of *q* units of goods, while it is assumed that the price-demand function *p*(*q*) is a continuous and twice differentiable real function. It is also envisaged that the price-demand function of a consumer is constructed in order to clearly motivate the consumer to buy *q* units of services at market price – *p* because the consumer feels the maximum rate of usefulness from consumer's strategy realization in this combination of price and demand. Analogously, the cost function describes a process of providing services by the operator so that quantifies the minimum of total production cost – *n* for an optimal combination of production factors required to produce *q* units of provided services.

While optimal consumer behaviour is described by the price-demand function *p*(*q*), the optimal operator behaviour is described by a profit function $\pi(q)$ which is formulated as the difference between revenue and costs of a company corresponding to a certain production volume of *q*:

$$\pi(q) = r(q) - n(q) \tag{6}$$

Where a continuous and twice differentiable real function of company revenue *r*(*q*) is defined as the product of price and supply volume, i.e.:

$$r(q) = p \cdot q = p(q) \cdot q \tag{7}$$

A company operating in every type of the market structure (a competitive company as well as a monopoly) seeks in a decision-making process such a com-

bination of price and supply of its product that guarantees a maximum level of the profit. This means that the operator also provides transport services in such a way that ensures the maximum profit. Analytically, this approach can be expressed as follows:

$$\pi(q) = r(q) - n(q) = p(q) \cdot q - n(q) \tag{8}$$

For optimizing the profit function, it is necessary that the function would reach its maximum at certain point of supply - q, i.e. that the first derivative of the profit function at this point is zero:

$$\frac{d\,\pi(q)}{dq} = \frac{d(r(q) - n(q))}{dq} = rm(q) - nm(q) = 0 \tag{9}$$

In the equation (9), $rm(q)$ is a marginal revenue function of the operator and $nm(q)$ is a marginal cost function. Based on (9), it can be seen that a company generally achieves a maximum profit for a volume of (q) when the marginal revenue equals to the marginal costs, i.e. a solution to the equation:

$$rm(q) = nm(q) \tag{10}$$

Then, it is possible to calculate such a price – p_p that maximises profit of the operator at the optimal level of supply q_p:

$$p_p = p(q_p) \tag{11}$$

In the case of the operator who operates in a non-regulated sector (e.g. long-distance transport), where the competition exists, the approach described in previous relationships (equations) cannot be applied. The operator accepts the price - p_K at the level of his marginal costs and he offers the production volume - q_K at that price (Fendekova and Fendek, 2010). This means that the following relationship applies:

$$p_K = nm(q_K) \tag{12}$$

On the other hand, due to its dominant position in the market a monopoly can influence the price of its product to achieve a higher profit in comparison with

competing companies. The monopoly determines an optimal price - P_M based on the optimization solution (8) and based on relationships (10), (11), that is:

$$p_M = p(q_M) \tag{13}$$

Based on above mentioned, the operator operating in a monopoly position can provide fewer services at a higher price compared to competitors. The approach is shown in Figure 2 based on which the following applies:

$$p_M > p_K \wedge q_M < q_K \tag{14}$$

It can be concluded based on Figure 2 that the operator operating in the competitive market would provide services in a volume of q_K at the price - p_K . If the average unit costs per unit of provided services are defined as:

$$n_j(q) = \frac{n(q)}{q}, q > 0 \tag{15}$$

Then the price of provided services will not cover even the average costs of the operator because:

$$n_j(q) > p_K \tag{16}$$

If the operator provides public transport services in such a case, the loss of the operator will be at the level of (according to the equation (8)):

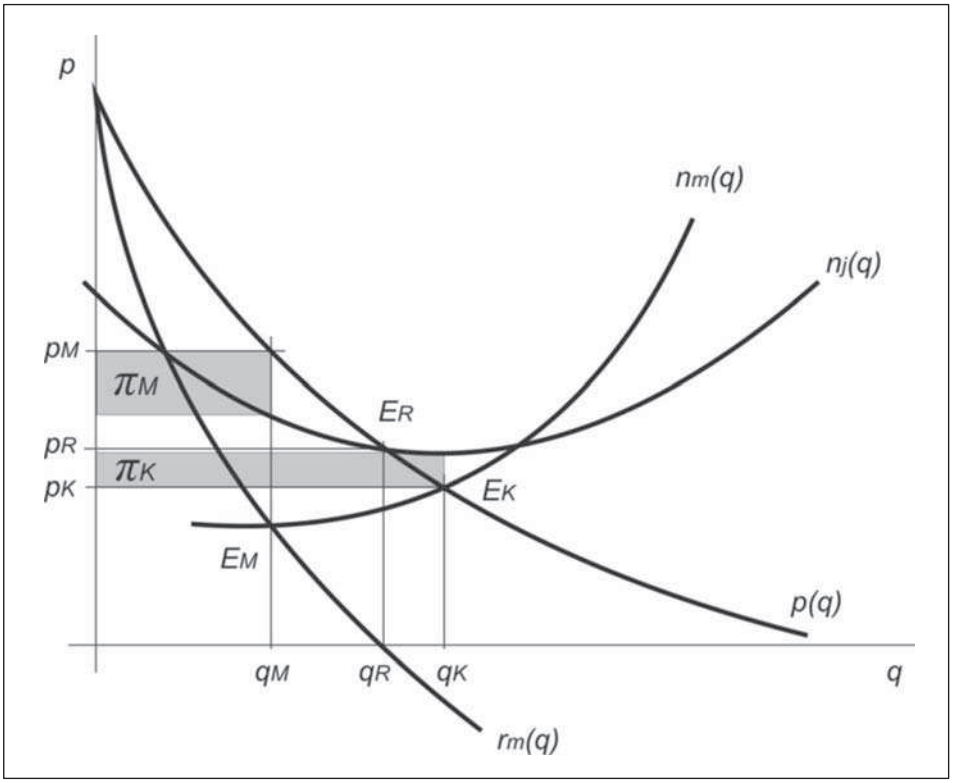
$$\pi_K = r_K - n_K = p_K \cdot q_K - n_{j_K} \cdot q_K = (p_K - n_{jK}) \cdot q_K, n_{jK} > p_K \tag{17}$$

If the operator acted as a monopoly in the same market, he would provide public transport services at the level of q_M at price - p_M and he would achieve, under these conditions, a profit - π_M at the level (Figure 2):

$$\pi_M = r_M - n_M = p_M \cdot q_M - n_{jM} \cdot q_M = (p_M - n_{jM}) \cdot q_M \tag{18}$$

Figure 2

MONOPOLY AND COMPETITIVE COMPANY



Source: processing by authors

And the following applies for the monopoly:

$$p_M > n_{jM} \tag{19}$$

If the public authority transfers cost and revenue risks to the operator and the operator assumes the risk associated with the decrease in the number of passengers, he will have to obtain a possibility to operate the entire network of public passenger transport in a given area. This position may be ensured by the public authority through granting a license. Thus, the operator becomes the only service operator in a certain territory during a certain time period. The mathematical

model shows that the model does not give a cost-effective solution to the public authority in case that the operator may change the fare level as well as planning of individual lines. The operator will provide lower performance as compared to competitive provision of transport services by more operators with the same remuneration paid from the position of the public authority. If the transport services are ensured by several operators, it is not right to delegate the revenue risk to the operators, because it would be problematic for the public authority to define particular operator's share of responsibility for the revenue risk.

The mathematical model shows that the hypothesis is not correct. The contract, within which the public authority transfers all risks to the operator, is not generally more advantageous than the contract through which the authority would create a competitive environment and the authority would assume revenue risk.

6. Conclusion

A public authority can decide which form of a public service contract will use when providing public passenger transport. One of the possibilities is to use a gross cost contract according to which the authority assumes revenue risks. Another possibility is to negotiate a net cost contract within which the authority is responsible for no risk (neither revenue nor cost risk) besides the contractually established financial contribution. A negotiation of the net cost contract may appear to be most appropriate from the perspective of the public authority. By using this type of contract, it is easier to plan the public budget because the fixed financial contribution (reward), which is paid by the authority, is determined in the contract. The aim of the paper was to assess the impact of individual contract types on public authorities and the provision of public passenger transport. Also, the hypothesis that the most advantageous contract from the perspective of public authorities is a net cost contract was tested. Based on the model developed in this paper, it must be held that the net cost contract cannot be considered as the most advantageous contract type from the perspective of public authorities. Mathematical model showed that if the operator ensures transport services in specific area as the only operator (a monopoly), there is an assumption that he will be ensuring lower performance (number of kilometres) and for the higher price for passengers in comparison with the market where more operators operate. On the other hand, if the public authority enables more operators operating in the market, (e.g. it allocates the lines between operators) it is not possible to transfer revenue risk to the operators.

The proposed model is applicable in the system of public passenger transport where a public authority awards exclusive rights for providing services (a license)

to a service operator. In EU conditions, such a system concerns mainly urban passenger transport and suburban transport. By awarding a license, the public service operator acts as a monopoly because other operators (without the license) are excluded from the market of public passenger transport. The public authority is also able to reduce (restrict) individual car transport by using traffic restrictions. The proposed methodology has minor use in the national or international transport serviceability where licenses are awarded to several service operators.

The contribution of this paper is a proposal of own methodology by which the risk transferred to an operator can be quantified. Before contract conclusion, the public authority can verify the effectiveness of the expected remuneration in relation to the quantified risk that the authority transfers to the operator. The application of this methodology will help public authorities to decide which type of a public service contract is more advantageous in its own conditions.

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ALOKACIJA RIZIKA U UGOVORIMA O USLUGAMA U JAVNOM PROMETU

Sažetak

U ovom se radu analiziraju rizici sadržani u ugovorima o uslugama u javnom prometu, i njihov utjecaj na financiranje prometnih usluga od strane javne uprave . Rad provjerava hipotezu je li ugovor sa neto troškovima najpovoljniji ugovor sa stanovišta javne uprave. Kod takvog tipa ugovora javne vlasti ne preuzimaju rizik u odnosu na pružanje prometnih usluga. Rad također analizira rizike do kojih dolazi za vrijeme korištenja prometne usluge. Rizici se dijele u rashodne i dobitne rizike. Rad predlaže postupak za kvantifikaciju tih rizika i predlaže izračun modela za Republiku Slovačku.

Ključne riječi: promet, financiranje, rizik, faktori, regija, javne službe