Chapter 8

Procedure for the Award of Contracts and Contracting in Public Passenger Transport

Miloš Poliak

Additional information is available at the end of the chapter

http://dx.doi.org/10.5772/64820

Abstract

This chapter describes a procurement process for providing transport serviceability by public passenger transport. The objective of the chapter is to present individual steps for procurement of public transport services. These steps consist of identification of objectives, definition of requirements for transport serviceability, risk allocation between contractual parties, drafting a public service contract and a process of selecting a service operator. Special attention is paid to the risks and their influence on contracting parties. The chapter also characterises procedure for the direct award of a public service contract, that is without competitive tendering. The author tries to define the impact of the direct award of contracts on the scope of services provided.

Keywords: procedure, contract, public, transport, risk

1. Introduction

Properly concluded contractual relationship allows the creation of a strong partnership through which the authorities can pursue their policy objectives. Such a partnership should prevent from neglecting fulfilment of the tasks or abusing position of one from parties. The key factor for providing public transport services is an adequate regulatory framework and contracting conditions that should be set to support the competitive behaviour of bidders—service providers.

The regulatory framework consists of three levels [1]:

- *Strategic* (setting basic objectives to be achieved: transport policy, public budgets, intermodality, etc.).

- *Tactical* (emphasis mainly on design of services and fares, requirements for staff, vehicles, additional services).
- *Operational* (ensuring the service provision in the market according to objectives: sale activities, information for the public, deployment of vehicles, maintenance).

In the process of preparing and contracting, the attention must be paid to aspects such as [2]:

- setting the rights and obligations of the parties,
- addressing the issue of infrastructure ownership and ownership of service provider (transport means and depots),
- risk allocation between the parties,
- responsibility for planning and design of services to be provided (freedom which be given to the operator in designing and making changes in services),
- scope of contract,
- structure of payment (it should represent a balance between profit and reward for realised performance),
- method of monitoring and controlling a fulfilment of public service obligations.

It should be noted that a proper adjustment of these aspects by authorities helps to operators improve efficiency of service provision and reduce costs.

1.1. Addressing the issue of ownership

The provision of public transport services requires on the one hand the availability of particular assets (such as infrastructures and vehicles), and on the other hand the management of those assets in combination with personnel.

There are several possibilities of ownership [3]:

- public ownership,
- *mixed ownership* majority private partner of more than 50% or minority private partner of less than 50%,
- private ownership.

Infrastructure ownership and ownership of service provider can be separated according to following ways (and the ownership can be organised differently for each part):

- vertical integration (where operator owns infrastructure),
- vertical separation (where operator does not own infrastructure).

In the case of vertical separation, it is necessary to address an issue of infrastructure management. The infrastructure can be managed by [3]:

http://dx.doi.org/10.5772/64820

- operator or
- authority organises infrastructure management separately from operator who provides passenger transport services.

In case that the transport operator manages infrastructure, a combination of ownership and usage may result in: [1, 4]:

- Delegated management where the operator acts independently from the authority and uses the assets provided by the authority. These assets may be provided based on various arrangements, for example "for free" or based on a contract regarding publicly owned infrastructure or through a leasing company.
- Public management where the assets are owned by the authority and transport services are provided by a public operator. Such provision of transport services may be ensured based on an in-house contract.
- In the third case which represents operators who provide assets. they are also responsible for service operation by using these assets. The contract based on which services are provided may take various forms and scope ranged from simple bus service contracts (where operators provide bus services by using their own buses) to more complex contracts (e.g. DBOT contracts—Design, Build, Operate and Transfer). Other type of contracts may represent infrastructure-concession contracts where operators may decide to some extent about the design of the assets and service realisation or PPPs contracts (Public–Private Partnership).

1.2. Public service procurement process

The process of public service procurement is complex and consists of several procedural steps, which must be done from authorities' position (see **Figure 1**) [3]. The basis of each process should be sufficient preparation. Good preparation can bring quality in services provided and effective use of public funds. Therefore, this part of the procurement process cannot be underestimated from the position of a public authority. In the first step, it is necessary to set the basic strategic objectives based on identified requirements of the public. Further, the services to be provided are characterised and designed. The services should be defined with respect to the criteria by which it will be possible to evaluate to what extent (range) a candidate (public service operator) is able to fulfil the provision of transport services. Last but not least, it is important to develop framework conditions of public service contract. Further step is related to award procedure, which can represent the direct award of contract or a competitive tendering. In the last step, a public authority implements the control procedures during contractual period whether a service operator meets its obligations.

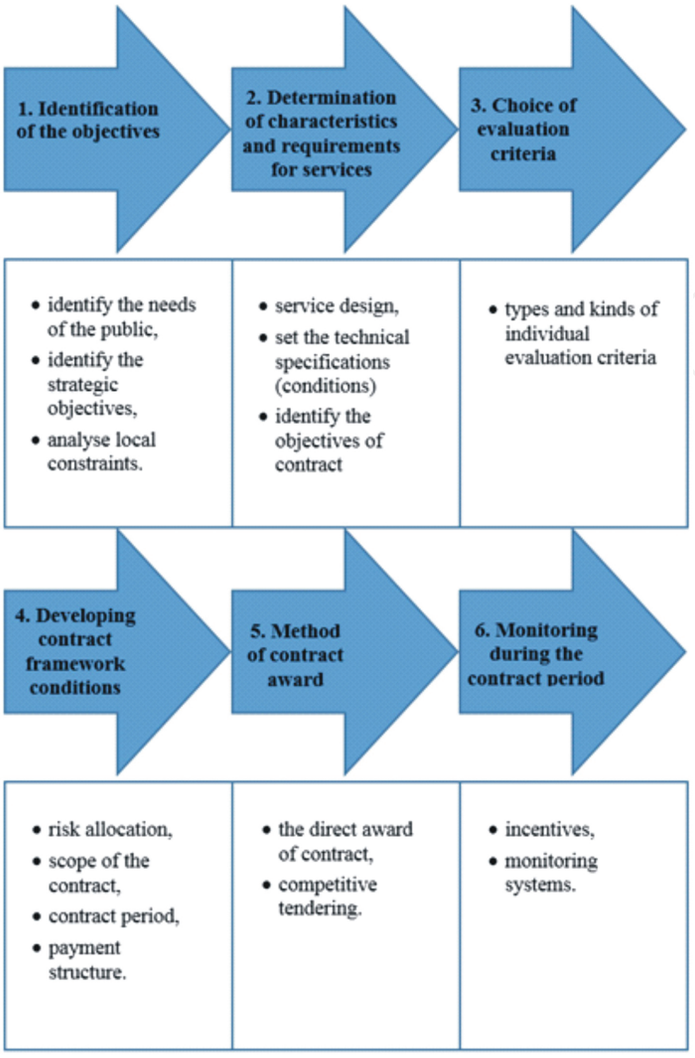

Figure 1. Procedure of public authority while contracting [3].

2. Identification of the objective

2.1. Identifying the needs of the public

The first essential step in the procurement is to determine the demand for public services—public passenger transport. Public service requirements can be found out by using different methods. One of the methods is an interview with passengers or potential passengers. The person responsible for obtaining information firstly selects a group of citizens who will be asked to answer simple questions. Ranking of requirements for public services in terms of quality and quantity is compiled at the end based on the answers [5].

Another method of identifying requirements of passengers is a form of questionnaire. The first step in creating a questionnaire is to determine the existing problem in public services.

http://dx.doi.org/10.5772/64820

Information about the problem can be obtained based on written complaints or verbal manifestations of citizens. Further, it is necessary to determine the objectives and indicators of questionnaire and to select a group of people to be queried. The advantage of questionnaires is fast obtaining the information in a short time and at relatively low costs. The questionnaires are sent directly to citizens or may be in the form of anonymous questionnaires.

By gathering information on requirements for public services, the strategic objectives can be determined.

2.2. Identifying the strategic objectives

The transport policy addresses public passenger transport and its objective is to ensure the sustainable development of mobility, coordination of public passenger transport with individual transport and improvement of road safety. Regarding the provision of public passenger transport, it is also necessary to take into account other policies such as social, environmental policy.

Typical strategic objectives within public transport are [3, 6]:

- Transport policy:
  - enhance total transport situation,
  - reliability of services,
  - ensure mobility,
  - increase market share of public transport within the intermodal market: influence the modal split, for example also by parking policy,
  - traffic safety,
  - link individual with public transport.
- Social policy—support for specific target groups:
  - people with low incomes,
  - people with limited mobility,
  - employees of the operator,
  - pupils, students and apprentices,
  - young and elderly,
  - accessibility for all layers/generations of the population.
- Environmental policy:
  - efficient energy use,
  - quality of life in urban areas,

- reduce emission of pollutants, for example reduction in global warming gas emissions,
- noise reduction,
- protection of vulnerable rural areas.

- Structural and economic policy (regional development)—enhancing services within specific areas:
  - infrastructure policy—establishing capacities, regulations for use and financing the public transport infrastructure,
  - regional structure,
  - support for small- and medium-sized enterprises,
  - site-related factors,
  - location trends,
  - land-use policy.
- Budgetary aspects.

Subsequently, the strategic objectives should be confronted with the local conditions.

2.3. Analysis of local constraints

To be able to properly transform strategic objectives into tactical means (service concepts), the relevant local circumstances (constraints) have to be identified and taken into account. Numerous aspects, tasks and competencies can have an impact on public transport.

Firstly, it is appropriate to analyse the local organisation of a concerned territory and to gain a good overview of the current distribution of tasks, competencies and responsibilities between the operators and the public authorities. Some further aspects to analyse are legal and economic aspects and the existing market structure as well as the existing transport system and geographical aspects [3].

Significant local circumstances (constraints) include [4, 6]:

- Existing local organisation of public transport:
  - localisation of information and skills,
  - localisation of decision-making powers for policy-making (strategic level) service design (tactical level) and operational decisions (operational level),
  - identification of roles and duties of public authorities and service operators.
- Legal restrictions:
  - existing contractual regulations,
  - existing awarding and contracting procedures,

http://dx.doi.org/10.5772/64820

- right of initiative,
- overcompensation,
- national/local legal framework,
- EU legal framework.

- Economic restrictions:
  - financial/budgetary aspects,
  - ability to bear risk by the authority,
  - economic situation of the operator market (including ability to bear risk).
- Market structure of service operators:
  - capabilities,
  - number and size,
  - efficiency,
  - ownership.
- Existing transport system:
  - vehicles,
  - network design,
  - infrastructure, for example existing railways, existing depots,
  - existing databases, for example passenger data, modal split figures,
  - level of quality of public transport services.
- Spatial/geographical restrictions.

3. Determination of characteristics and requirements for services

The further step prior to the conclusion of public service contract is a characterisation of services and definition of requirements for services. It is also necessary to divide the tasks, competencies and responsibilities between the operators and the public authorities in order to ensure efficient provision of public service.

3.1. Service design

In order to reach the decision on an adequate level of competence of service operator when designing services, it is recommended to answer the following preliminary questions first [5]:

- Which interests are in conflict with each other?
- Which interests need to be harmonised (and how)?
- To what extent can a natural overlap between the commercial and other interests of the operator, the interests of the public as well as the interests of the authorities be expected?

It is necessary to note that the allocation of responsibilities determines the appropriate risk allocation between the operator and the authority. Whoever takes the opportunities and risk is the party most appropriate to influence the corresponding features.

Decision-making on service design (i.e. tactical decisions) can be organised in different ways. It should be distinguished between two basic periods:

- The period during which the contractual relation between operator and authority is established.
- The period during which the contract is realised.

For each of these two periods, fundamental organisational decisions have to be taken as to the allocation of initiative power and decision power to the authority and to the operator [3].

Within the first period of establishment of the relation, service design can be determined [2]:

- by the operator *through the bid* that he delivers to the authority; in the context of awarding, this is also known as *"functional"* awarding,
- in a negotiated way between the operator and the authority *during* the contracting process; this intermediate way to organise things is also known as *"negotiated"* or
- by the authority *prior* to contracting; in the context of awarding, thesis also known as *"constructive"* awarding.

During the second period of contract realisation, service redesign can also be organised in different ways [1]:

- It can be determined by the authority, or
- It can be determined by the operator:
  - the operator may only have the possibility to suggest amendments to the network, whereas the authority remains in charge of deciding upon the implementation of those changes after conducting a check on the desirability and/or financial consequences of the change or
  - the operator may have the freedom to modify services autonomously as he wishes (indeed, within specific norms of network accessibility specified by the authority within the contract).

3.2. Determination of technical specifications (conditions)

Technical specifications and conditions are understood to be the determination of characteristics and requirements, which must be fulfilled in the bids submitted by tenderers in order to

http://dx.doi.org/10.5772/64820

obtain a contract. Technical conditions are part of the tender documentation. Technical conditions may be determined either by the form of references to the documents, standards, regulations and acts or by the form of requirements for parameters of expected utility, for example setting requirements for performance, capacity.

Individual characteristics and requirements for services must be set so that none of the tenderers and candidates is discriminated and the principles of transparency, economy and efficiency must be applied.

3.3. Identifying the objectives of contract

The objectives should not be specified too general. It is favourable if the concretisation of subject of the contract in the form of objectives is a part of tender documentation. This contributes to the improvement of evaluation process, award procedure as well as control process. Correct determination of objectives is an assumption for easier definition of evaluation criteria. Requirements for the characteristics of objectives are presented in **Table 1**.

Characteristic of objectives	Description	Example
Verifiability	An objective can be verified	Technical parameters
Quantifiability	An objective can be measured	Number of kilometres travelled, hours of operation
Objectivity	An objective relates directly to the purpose of contract	Quality of the carriage of passengers
Consistency	Mutual continuity of objectives	Reduction the transport impact on the environment by promoting public transport

Table 1. Requirements for the characteristics of objectives.

4. Choice of evaluation criteria

A public authority must determine evaluation criteria, which reflect the expectations that are to be achieved through public transport services. The evaluation criteria can be distinguished in terms of type and kind. Individual types and kinds of evaluation criteria with stated examples are presented in **Table 2**.

4.1. Transformation of qualitative criteria into quantitative criteria

In order to determine to what extent the feature of quality is fulfilled, it is necessary to find a way to measure particular feature of quality. Transformation of qualitative criteria into quantitative criteria is performed due to the measurability of quantitative criteria. The intensity of quality can be measured, for example, by using ten-point scale. Interval of scoring is compiled from the unsatisfactory quality up to the perfectly satisfactory quality [7].

Types of evaluation criteria	Kinds of evaluation criteria	Examples
Quantitative	*Cost*	The lowest offer price
		repairs and maintenance
		operating costs
		return on investment
	Utility	Technical level
		technical parameters
		environmental impact
	Time	Interchanges
		continuity
		time of transport
qualitative	*Quality*	Safety and comfort
		caring for passenger

Table 2. Types and kinds of evaluation criteria.

5. Preparation of contract

Basically, the forms of individual contracts differ in an allocation of risks between contractual parties and the resulting structure of payments.

5.1. Risk analysis in public passenger transport

There is a methodology, not only in the SR, but also in other countries, on the basis of which the reasonable profit is determined as percentage of economically justified costs. But in this case, the operators are not motivated to save up the costs and it is also contrary to the policy of the European Union. The reasonable profit for services, which are provided in public interest, should be based on the risk assumed by operator. Therefore, an analysis of the risks existing in providing public transport services is needed.

The risks existing in providing public transport services can be categorised [2]:

- *Systematic risks*—such risks include political risks (government decisions, changes in government policy…), international risks (changes in foreign exchange rates…), economic risks (price development, population purchasing power…), interest rate changes, inflation risk and risk of unforeseen events.
- *Unsystematic risks* are the risks associated with the revenue of company and its ability to cover liabilities. These risks may be influenced by an investment project quality, deployment environment, qualified management, etc.

Existing risk can be also further divided into two groups—cost and revenue risks (see **Figure 2**).

http://dx.doi.org/10.5772/64820

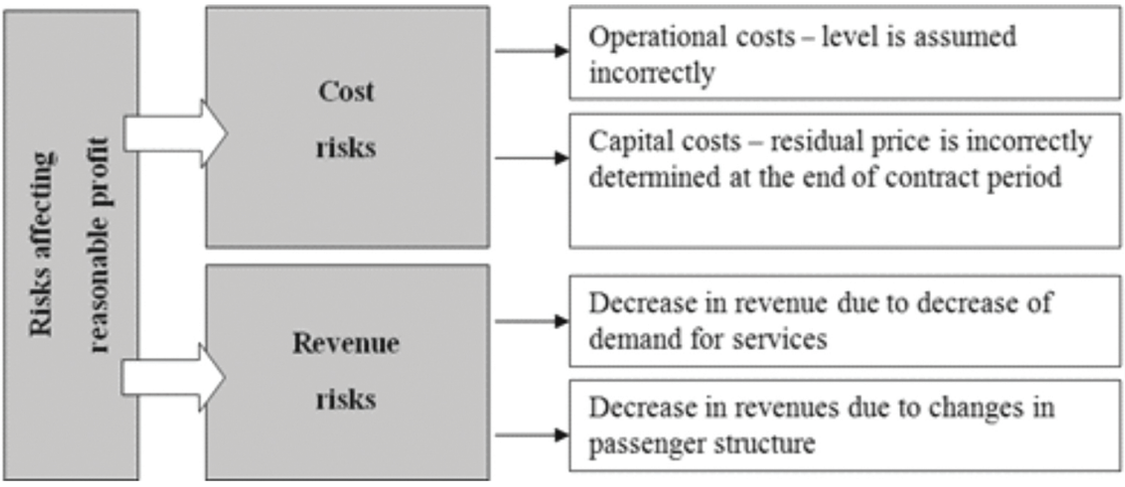

Figure 2. Classification of the risks in public passenger transport.

5.1.1. Cost risks

The cost risks are associated with a cost calculation when contracting in public economic interest. In public service contract, it is necessary to agree on a price for realised performance, which consists of the costs and profits of public service operator. In the case that the operator assumes the cost risk, it is necessary to agree on a scope of realised performance for the contract period and economically justified costs per unit of the realised performance between operator and authority. The cost risks can be divided into two groups [5]:

- *Operational cost risks* which are related to the difference of the anticipated costs calculated and the actually observed costs after performance realisation. The reasonable profit must depend on an allocation of this risk. When the operator does not assume the risk and after realisation of performance he proves eligibility of costs to authority for the purpose of compensation, the operator takes no cost risk for the performance realisation. In the case that the agreed unit costs in public service contract are final, the operator assumes the cost risk and this should be reflected in appropriate level of reasonable profit. The operational cost risks can be further divided as follows:
  - *External operational cost risks*—the risk that cannot be influenced by the operator at all (e.g. cost increasing due to flooding streets in the event of natural disasters). This group can also include the risk which can be influenced by operator indirectly or only in small extent (e.g. changes in energy prices during the contract period, change in employees' costs, etc.).
  - *Internal operational cost risks*—the risk that can be influenced by the operator, for example the costs of maintaining of vehicle fleet (the operator can decide on the maintenance process in order to avoid failure of vehicle and higher costs).
- Investment cost risks are related to the difference of the anticipated life of the fixed assets of the operator. While providing public passenger transport, it is primarily the means of transport and infrastructure (e.g. bus and tram stops, tram tracks). The reasonable profit

must depend on which party assumes the risk of the difference of actual net book value of fixed assets at the end of a contract period compared with anticipated net book value.

5.1.2. Revenue risks

The revenue risks are associated with the difference between expected revenues from operation of public passenger transport and actually achieved revenues at the end of contract period. These risks may be taken either by authority or operator and in this regard there must be appropriately set a profit level of the operator. When the authority assumes the revenue risk, a contractual relationship between the authority and the operator, which sets a compensation for realised performance, is based on the following formula [6]:

$$C = (UC + RP).P - R \tag{1}$$

where C—compensation of the authority for the operator,

UC—costs per unit of realised performance,

RP—reasonable profit for the operator expressed per performance unit,

P—the realised performance,

R—revenue achieved when realising performance.

When there are agreed final costs per unit in public service contract, which cannot be changed during a contract period, the cost risks are fully borne by the operator. The revenue risks are borne by the authority. This means that if operator's revenue is decreasing, the compensation from authority's party is increasing.

When the operator assumes the revenue risk, in the contract there is determined in addition to realised performance also absolute amount of compensation, which cannot be changed during a contract period. The compensation is based on anticipated costs and revenue, while changes in costs and revenue pose a risk of the operator. A part of the compensation is a reasonable profit of the operator resulting from cost and revenue risk of realised performance.

The cost risks are not usually related with interventions of public authorities (with an exception of changes in tax burden of the operator), and currently, they are usually transmitted to operators. In the case of revenue risks, it is possible to define influence of public authorities on revenue risks; the risks can be divided into two groups:

- *revenue risk associated with a decrease in demand*—it is a risk related to the changes in number of passengers carried when providing public passenger transport. In the case that the authority bears the revenue risk, it is necessary to appropriately involve the operator in compliance with required quality because the amount of the compensation in this case does not depend on the number of passengers carried (In the SR, 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). When it comes to the revenue

http://dx.doi.org/10.5772/64820

risk associated with a decrease in demand, it is necessary to distinguish territories in which the transport services are operated. The development of number of passengers carried 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 which can be economic, environmental, social and governmental.

- *revenue risk associated with a change in passenger structure*—it is the risk of revenue change because of a change in passenger structure. For example, when the selected groups of passengers (students, pensioners) travel with special fares, an increase in 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, it is important to monitor the impact of price changes on the demand, which varies considerably for particular groups of passengers. In the Slovak Republic, the discounted fares known as saver tickets (half price of a full fare ticket) are for young people aged 6 to 15 and students to 26, and fares known as "other fares"[1] are for: senior citizens over 70 (€ 0.20 per every 50 km, severely disabled people (half fare travel), parents travelling to visit their physically or mentally disabled, chronically ill children nourished in special facilities in Slovakia (half fare travel). The public passenger transport fare is regulated by public authorities that decide which specific groups of passengers will be entitled to reduced fares; and therefore, the revenue risk associated with the change in passenger structure can be classified as the risks associated with interventions by public authorities.

5.2. Risk allocation between the contracting parties

The authority has to decide upon how to allocate risks between contracting parties appropriately. Risk can have a negative effect on the outcome of contracting, especially when using competitive awarding [3]:

- The higher the risk, the lower the number of bidders (high entry barriers).
- A very high level of risk, resulting out of a high level of uncertainty, may result in a higher danger of insolvency for operators in case of a full realisation of the risk.
- The higher the risk, the higher the risk premium the operator is calculating (increasing the subsidy to be paid by the authority).

Therefore, from a very schematic point of view, risk can be classified as follows [1]:

- *High risk*—High uncertainty and/or critical for operator in case of realisation (operators will calculate a high risk premium).
- *Low risk*—Predictable for operators and/or not critical for operators in case of realisation (operators will calculate a low risk premium).

[1] Decree of Office of Rail Regulation No 654/2005 lays down the scope of price regulation for railway transport and price quotations of self-governing regions which determine the maximum prices for national regular bus transport when the distance from origin to final bus stop exceeds 100 km

- *Unbearable risk*—Unpredictable and critical for operator in case of realisation (risk not bearable for operators—market entry barrier).

A contract form and payment structure is dependent on a way of the risk allocation. The contract forms are as follows:

- *Management contract*—operator bears no risk; cost and revenue risk is borne by authority that pays the economically justified costs to operator. Those costs are accounted in the end of period. This means that the risk from difference between anticipated and actual costs is borne by authority, which bears also the risk from difference between anticipated and actual revenue. In this case, the level of reasonable profit of operator should relate only to numb capital during providing transport services because he bears no risk. The reasonable profit, in this case, must include, in addition to the numb capital, also a reward for assuming the cost risk.
- *Gross cost contract*—operator bears cost risk; the risk from difference between anticipated and actual costs in the end of period and the authority bears the risk from difference between anticipated and actual revenue.
- *Net cost contract*—operator bears cost and revenue risk. In this case, the operator bears the risk from difference between anticipated and actual costs/revenue, which are identified in the end of contract period. The authority pays only compensation, which is agreed before realised performance to operator. This means that the authority bears no risk.

The essential advantages and disadvantages of gross and net cost contracts are presented in **Table 3**.

	Advantages	**Disadvantages**
Gross cost contract	• Reliable calculation for operator. • Low barriers for market entry. • High legal certainty. • Enforcement of public interests (e.g. tariffs). • competition neutrality.	• No entrepreneurial interest. • High level of regulation. • No budget reliability for public authorities. • High monitoring efforts.
Net cost contract	• Preservation of entrepreneurial interest. • Lower monitoring charges—customer as "adjustment factor". • Constant amount of compensation payments. • Minimal requirements have to be defined.	• Low legal certainty (in case of tendering because of missing database). • Higher risk for operators—risk premium and higher compensation payments. • No incentives to consider social, environmental and political goals.

Table 3. Advantages and disadvantages of gross and net cost contracts.

http://dx.doi.org/10.5772/64820

5.3. Determination of risk and reasonable profit when financing public passenger transport

Determination of reasonable profit as a percentage of costs is economically incorrect in a regulated sector. The reasonable profit must relate to the risk that is borne by operator in regard to realised performance. This means that the level of reasonable profit must be higher in case of the operator bearing cost and revenue risks in comparison with the operator bearing only cost risks while keeping the same range of performance.

Based on the previous analysis of risk allocation, the level of reasonable profit can be defined as follows [1]:

1. *Operator bears no cost or revenue risks*—the risks associated with providing transport services are borne only by authority; and therefore, the level of reasonable profit should relate only to the capital used by operator when providing transport services. A reward for provided capital of operator should depend on profitability level of capital invested in terms of deposits with guaranteed returns. The reasonable profit in management contracts is calculated according to following formula:

$$RP = CO.p \tag{2}$$

where: RP—reasonable profit,

CO—capital invested by operator for providing transport services,

p—capital profitability.

2. *Operator bears cost risks*—the level of reasonable profit must consist of two parts: the reward for provided capital of operator (the same as mentioned above) and the reward corresponding to the cost risks. The reasonable profit when contracting for public interest and where operator bears cost risk is possible to determine according to following formula [6]:

$$RP = CO.p + \left(\sum_{i=1}^{n} (C_i.R_{Ci})\right).P \tag{3}$$

where: C_i—i's value of cost item of operator in unit expression,

R_{Ci}—risk of assumed value of i's cost item in percentage expression from cost item value,

n—number of operator's cost items,

i—i's cost item of operator,

P—realised performance.

It is necessary to define the way of risk determination of estimated values of individual cost items in relation to reasonable profit. The risk can be calculated by using the relationship for determination of safety surcharge to net premiums.

3. *Operator bears cost and revenue risks*—the level of reasonable profit must consist of three parts: the reward for provided capital of operator (mentioned above), the reward corresponding to the cost risks (mentioned above) and the reward corresponding to revenue risks. The reasonable profit when contracting for public interest and where operator bears cost and revenue risks is possible to determine according to following formula [6]:

$$RP = CO.p + \left(\sum_{i=1}^{n} (C_i.R_{Ci}) \right).P + \left(\sum_{j=1}^{m} (R_j.R_{Rj}) \right).P \quad (4)$$

where j—j's group of passengers with the same fare level,

m—number of passenger groups which are different by fare level,

R_j—assumed revenue of j's passenger group in unit expression,

R_{Ti}—revenue risk of j's passenger group expressed in percentages.

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

5.4. Scope of contract

In terms of the scope of the contract, a public authority can decide on:

- *route contracts*—used for a specific bus line or can include a group of shorter bus lines located close to each other,
- *network contracts*—these contracts cover whole city territory and network of city public transport or they are related to more transport modes such as metro, bus and tram,
- *sub-network contracts*—related only to a certain part of city (e.g. suburb of city) and only one mode of transport.

The contract size has an influence on efficiency. The contract size has an influence on efficiency. Related to matters of risk, this aspect mainly affects the market entry possibilities and might result in an overly elevated complexity level for the respective service operators.

Network contracts [3]:

- increase the need to select long term contracts,
- provide integrated public transport services delivered by one operator to passengers,
- produce market entry barriers for small- and medium-sized companies,
- account for a great operational complexity,
- enable net cost contracts,

http://dx.doi.org/10.5772/64820

- provide substantial optimising opportunities to the operator and therefore may increase efficiency levels,
- might be more difficult to monitor.

Route contracts [3]:

- low market or no market entry barriers exist for small- and medium-sized operators,
- integration of public transport services needs to be realised through other organisations (authority or related body),
- in case of dependency on the performance of other operators, net cost contracts are not recommended,
- provide fewer optimising opportunities.

Sub-network contracts

Sub-network contracts provide a compromise between network contracts and route contracts if required.

5.5. Duration of contractual period

When designing the length of contract period, the public authority should take into account the level of revenue risk borne by the operator in order to allow him to develop market activities for increasing the number of passengers.

5.5.1. Flexibility during the contract period

Changes in external factors, political aims or passenger needs can lead to a need for amendments to service design during contract period. Therefore, certain flexibility should be incorporated in contracts.

Contracts should contain appropriate variations and termination clauses [3]:

- Enable service redesign by the operator autonomously when using net cost contracts (with functionally designed minimal standards) while preventing negative financial impact to authority.
- Enable the authority and the operator to terminate (or at least renegotiate) the contract in case of major unforeseen changes with major commercial influence.
- Check whether there will be major changes during the contract time (e.g. a new bus lane within the centre during the contract period) and insert suitable agreement procedures on how to deal with these circumstances.
- Enable service redesign by the operator after approval of the authority under all awarding models, based upon fixed price list and limitations (e.g. limited increase in vehicle-km) to reduce risk for the operator and the authority.

- Insert arbitration clauses to avoid unproductive conflicts.
- Enable service redesign by the authority in case of constructive design, based upon fixed price list and limitations (e.g. limited increase in vehicle-km) to reduce the risk for the operator (and the authority).

It is necessary to note that the longer the contract period, the more increases the need for flexibility of the contract. In case of high uncertainty about future developments (e.g. major changes within the coming years without any sufficient expectations on the influence on the contractual outcome), a short contract period is recommended (maybe including extension options) [1].

In terms of decision-making on contract period, it can be recommended as follows [5]:

- Decision based on trade-off between flexibility (short-term contract) and increasing incentive to make capital investments (long-term contract).
- Use of short-term contracts in case of high uncertainty about future development (e.g. net cost contract with high uncertainty about development of the ridership).
- Avoiding too short contract periods as this causes increasing uncertainty (which may result in lower interest of operators on that contract).
- Use of long-term contracts in case of high specific investment needs with long amortisation periods, including review dates on the performance.
- Avoiding too long contract periods in case of competitive awarding to secure competition within the market.
- Use of longer-term contract when substantial market action is required from the operator (take account of longer lead times to develop measures and to reap the profit of their implementation).
- Use of short-term contracts in case of the need for increased flexibility.
- Avoiding too long contract periods to be able to recalibrate contract clauses according to market development.

5.6. Payment structure

Payments which are paid to operators in return for service provision may represent variable, fixed payments or their combination. However, it is important to determine a clear and verifiable payment structure in order to avoid misunderstandings and disputes between contracting parties during the contract period. It should be also noted that financing of infrastructure should be separated from operation financing due to transparency reasons [3].

Payments may flow not only from an authority to an operator but also in opposite direction from an operator to an authority. The situation is dependent on the market conditions. For example, the award of a very profitable service contract to the service operator through a competitive tendering may bring the situation of payments flowing from the operator to the

http://dx.doi.org/10.5772/64820

authority. However, as many public transport services cannot be provided on a commercial basis, the payments which are paid to service operators from authorities are more usual in practice. The situation also depends on the structure of the additional incentives, which may be included in individual public service contracts.

The amount of the payment to be paid depends on various factors. These factors relate to the type and scope of a particular public service contract, which is awarded to a particular operator [1].

To reduce the risk level, it is recommended to include a lump sum payment. Inclusion of variable payments, which represent incentive-based payments into a public service contract, may motivate the operator to achieve the objective set by the authority.

As previously mentioned, the structure of payments must be determined in a clear manner. It is recommended to reduce complexity as much as possible in favour of a simple payment structure. This may also reduce the level of risks and avoid the high entry barriers to the market.

6. Procedure from the position of service providers in procurement of the transport service

In general, the candidates (tenderers) are understood to be the entities who offer a solution of bids (public service contract). Transport services may be provided after the conclusion of public service contract between the successful tenderer and competent authority (public authority). The main objective of a tenderer is to gain a competitive advantage over the other tenderer and thus succeed in a competitive tendering.

6.1. Procedure of service providers in competitive tendering

Procedure of service providers in competitive tendering should consist of the following steps:

- analysis of own position in competitive market,
- analysis of the needs and requirements of the public,
- analysis of technical conditions, the subject and criteria of the public contract,
- compilation of the bid and its submission.

6.1.1. Analysis of own position in competitive market

Success rate of a tenderer is dependent on the quality and quantity of services offered. The tenderer as an economical subject acts as a competitor in relation to other tenderers and towards the contracting authority as a potential provider of services. The tenderers, who wish to be involved in competitive tendering for public services for the first time, should perform an analysis of the competitive environment in a given sector of services. This analysis includes an analysis of strengths and weaknesses, and the opportunities and threats. Thanks to the

analysis, the tenderers may find out their position in the market or look for ways to improve or retain that position.

In the case that tenderer already participated in competitive tendering in previous periods, he may have plenty of information for predicting the capabilities and behaviour of the competitors. The tenderer should already be familiar with the evaluation criteria as well as their weights of importance. He should be able to create his own evaluation system, the results of which are depicted on the matrix of strengths and weaknesses. On this basis, it is then possible to evaluate own chances of tenderer or take action to improve existing conditions.

6.1.2. Analysis of the needs and requirements of the public

In the case that tenderer is able to identify the exact needs of the public, he has an advantage over the competition. The first step is to identify deficiencies in area of public passenger service, for example number of joints, accessibility of stops, points of transfer, continuity. According to these findings, a tenderer is able to create the concepts and plans for increasing the number of passengers in the future, which may increase the likelihood of success in a competitive tendering.

6.1.3. Analysis of technical conditions, the subject and criteria of the public contract

In terms of technical conditions of contract, a potential provider of transport services must examine in detail the technical conditions, characteristics and requirements for transport services.

Technical conditions may be distinguished as follows [2]:

- technical conditions in relation to expected fulfilment of public contract,
- technical conditions promulgated by contracting authority.

Precise definition of the subject of public contract is a certain orientational point to obtain the public contract by a tenderer. Subject of fulfilling the public contract is defined in the tender documents. In the case that tender documents do not contain the subject of public contract, a contracting authority is obligated to send to a tenderer the subject of public contract in written or electronic form within the period stipulated by the Act.

6.1.4. Compilation of the bid and its submission

Content of the bid should be drafted so that a tenderer is able to demonstrate:

- financial position,
- technical competency,
- professional competency.

The tenderer is obliged to draw up a bid based on the instructions for compiling bids that are contained in tender documents. He is obligated to comply with all the requirements specified in those instructions in order to succeed in competitive tendering.

http://dx.doi.org/10.5772/64820

It would be appropriate from tenderer's position to nominate the person responsible for compilation and submission of bids.

6.2. Approach of operators to various contract forms

From the position of public authorities that plan funds for providing public transport services, the net cost contracts appear to be the most advantageous. Under this contract form, all the risks, cost and revenue, are borne by the operator. The authority pays to operator a financial amount that is fixed determined at the beginning of a contract period and stated in the contract. In this case, the public transport services in a given area are provided only by selected operator through a license. Such an operator has the option to set the level of fares because he also assumes revenue risks.

The gross cost contract is advantageous for operators because they do not bear the risk of revenue decreases, which is usually associated with the factors that cannot be influenced by operators.

Based on mathematical modelling of a price regulation and determination of business reasonable profit in network industries, Fendekova and Fendek [8], they mathematically model an approach of the enterprise in regulated sector and they define two approaches that can be applied in providing public transport services:

- Approach of enterprise applying return on investment—the approach encourages an enterprise to use a high volume of capital in order to achieve the maximum permitted reasonable profit. The enterprise has no incentive to use more efficient combination of inputs, for example supporting employment in comparison with an end in itself investment in facilities.
- Approach of enterprise applying increasing the volume of outputs—in this case, if the authority does not have the possibility or manpower for verifying effectiveness of providing public transport service, the operator will seek to realise also inefficient performance.

6.2.1. Approach of operators to gross cost contracts

The operator assumes all cost risks under gross cost contracts in providing public transport services, whereas the authority bears revenue risks related to a decrease in the number of passengers. Documents for optimisation of public transport services are available for the operator and in case that the authority does not have sufficient access to the data about the number of passengers on particular bus routes, he is not able to optimise public transport services. It is necessary to continuously optimise providing public transport services when the number of passengers decreases. In terms of business interest, the operator who bears no revenue risk is willing to operate also the buses without any demand because the authority bears the risk that bus will not be used by passengers. For example, if there was abolition of a production plant into which the operator provides transport services for employees and the authority did not change a transport license, the operator would continue in providing transport services because a decrease in revenue (in this case to the zero level) would be compensate by the public authority assuming revenue risk.

This approach assumes that a fare level is also determined in the public service contract. The deficiencies of such contracts may be addressed by contractual clause based on which the authorities have an access to the electronic data on the number of passengers in real time and thus they can obtain materials to optimise the transport services.

6.2.2. Approach of operators to net cost contracts

Under these contracts, the operators assume not only cost risk but also revenue risk related to providing transport services. 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 served area with an exclusion of other operators (during the license period). Following from the analysis processed by van de Velde [3], 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 served area during the licence period. The following mathematical model defines a procedure of such operator in relation to providing transport services.

Assume that the operator is a company that aims to make a profit. Based on a license and a public service contract—net cost contract, the operator provides a range of transport services bounded by demand of q. Start from a general assumption which is acceptable in any type of market structure, the consumption of a product offered in the market is described by a price-demand function that expresses willingness of consumer to buy q units of services provided at given price—p.

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

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

$$n = n(q) \tag{6}$$

The equation presents the amount of minimum costs of n which are spent by producer in the production of q units of goods, while it is assumed that a price -demand function p(q) is continuous and twice differentiable real function. It is also envisaged that the price-demand function of 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 strategy realisation in this combination of price and demand. Analogously, the cost function describes a process of providing services by 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 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 company corresponding to a certain production volume of q:

http://dx.doi.org/10.5772/64820

where a continuous and twice differentiable real function of company revenue r(q) is defined as the product of price and supply volume, that is:

$$\pi(q) = r(q) - n(q) \tag{7}$$

$$r(q) = p.q = p(q).q \tag{8}$$

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

$$\pi(q) = r(q) - n(q) = p(q).q - n(q) \tag{9}$$

For optimising profit function, it is necessary that the function would reach its maximum at certain point of supply—q, that is that the first derivative of the profit function at this point is zero:

$$d\pi(q) / dq = d(r(q) - n(q)) / dq = rm(q) - nm(q) = 0 \tag{10}$$

In the Eq. (10), rm(q) is a marginal revenue function of the operator and nm(q) is a marginal cost function. Based on Eq. (10), it can be seen that a company generally achieves a maximum profit for a volume of q when the marginal revenue equal to marginal costs, that is a solution to the equation:

$$rm(q) = nm(q) \tag{11}$$

Then, it is possible to calculate such a price—pp that maximises profit of the operator at the optimal level of supply qp:

$$pp = p(qp) \tag{12}$$

In the case of the operator who operates in 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—pK at the level of his marginal costs—and he offers the production volume—qK at that price. This means that the following relationship applies:

$$pK = nm(qK) \tag{13}$$

On the other hand, a monopoly due to its dominant position in the market can influence the price of its product so that to achieve higher profit in comparison with competing companies. The monopoly determines an optimal price—pM based on the optimisation solution Eq. (9) and based on relationships Eqs. (11), (12), that is:

$$pM = p(qM) \tag{14}$$

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 1** based on which the following applies:

$$pM > pK \wedge qM < qK \tag{15}$$

It can be concluded based on **Figure 3** that the operator operating in a competitive market would provide services in a volume of qK at the price—pK. If the average unit costs per unit of provided services are defined as:

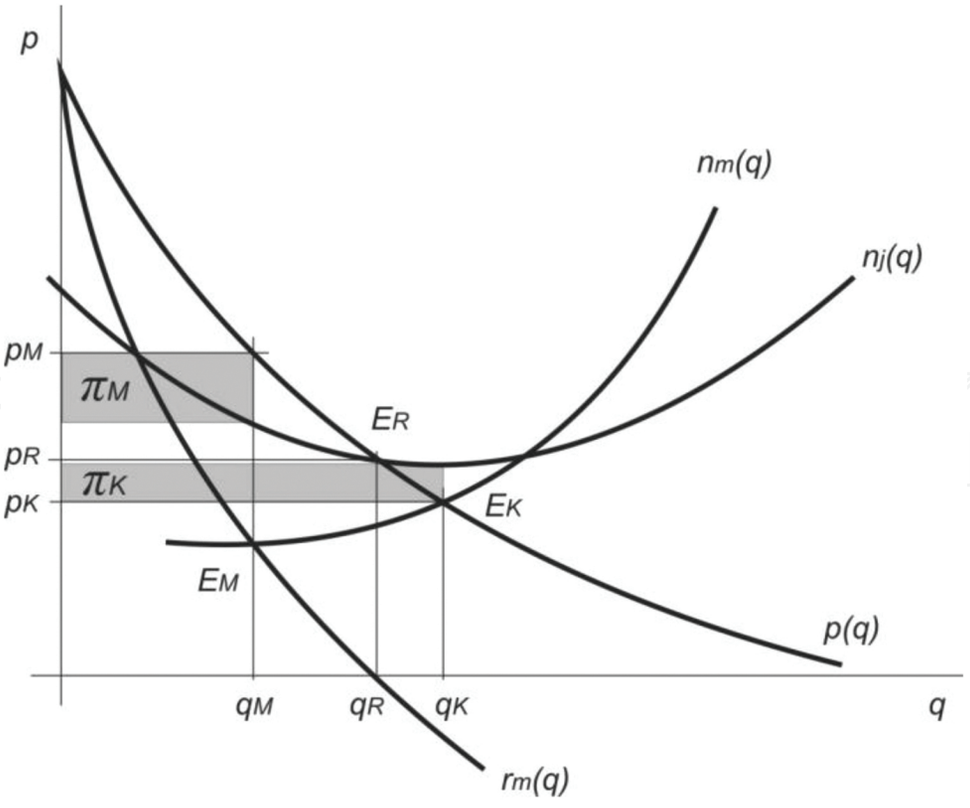

Figure 3. Monopoly and competitive company.

http://dx.doi.org/10.5772/64820

$$nj(q) = n(q) / q, q > 0, \tag{16}$$

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

$$nj(q) > pK \tag{17}$$

If the operator provides public transport services in such a case, the loss of operator will be at the level of (according to the Eq. (9)):

$$\pi K = rK - nK = pK.qK - njK.qK = (pK - njK).qK, njK > pK \tag{18}$$

If the operator acted as a monopoly in the same market, he would provide public transport services at the level of qM at price—pM and he would achieve, under these conditions, a profit —πM at the level (**Figure 3**): because the following applies for the monopoly:

$$\pi M = rM - nM = pM.qM - njM.qM = (pM - njM).qM \tag{19}$$

$$pM > njM \tag{20}$$

While providing public transport services, the operator in a monopoly position achieves higher profit in comparison with the operator who operates in the market of perfect competition. If the public authority decides on a net cost contract, according to which the providing transport services is in the competence of the operator, there will be the risk of lower quality or the risk of lower performance than in comparison with the case of gross cost contract.

The public authorities tend to issue a license for one operator to provide public transport services for whole served area and consequently to conclude a net cost contract. Under this contract, the decision on an organisation of public transport service including pricing is in the competence of the operator. However, it is important to note that this procedure can lead to reducing quality of providing services.

Author details

Miloš Poliak

Address all correspondence to: milos.poliak@fpedas.uniza.sk

University of Žilina, Žilina, Slovakia

References

[1] Poliak, M. Vzťah primeraného zisku a rizika v hromadnej osobnej doprave na Slovensku. Journal of Economics. 2013;61(2):206-220.

[2] Stanley, J., van de Velde, D. Risk and reward in public transport contracting. Research in Transport Economics. 2008;22(1):20-25.

[3] van de Velde, D. et al. Competitive tendering in the Netherlands: central planning vs. functional specifications. Transport Research Part A. 2008;42(9):1152-1162.

[4] Lalive, R., Schmutzler, A. Exploring the effects of competition for railway market. International Journal of Industrial Organization. 2008;28(2):443-458.

[5] Poliak, M., Krizanova, A. Semanova, S., Stefanikova, L. The influence of contract form choice of the transport services ensuring on performance contracting entity requirement. Transport Problems: International Scientific Journal. 2014;9(4):153-161.

[6] Hensher, D.A. - Wallis, I.P. Competitive tendering as a contracting mechanism for subsidizing transport. Journal of Transport Economics and Policy. 2005;39(3):295-321.

[7] Nedeliakova, E. - Panak, M. New trends in process-oriented quality management. Procedia Economics and Finance. 2015;34(1):172-179.

[8] Fendeková, E., Fendek, M. Modely cenovej regulácie sieťových odvetví. Journal of Economics. 2010;58(10):1039-1054.