

TEXTO PARA DISCUSSÃO Nº 1030

**ECONOMIC REGULATION AND
COST-EFFICIENCY IN BRAZILIAN
URBAN PUBLIC TRANSPORT:
THE CASE OF BELO HORIZONTE**

Alexandre de Ávila Gomide

Brasília, julho de 2004

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ABSTRACT

The transport economics literature has indicated that introduction of competition for the market in urban bus services (i.e. by means of competitive bidding) could promote cost-efficiency with low fares and better quality services. Therefore, this paper analyse the main outcomes and the latest consequences of the bidding process occurred during 1997-1998 in Belo Horizonte with the use of operational data. Did economic efficiency improve? Did fares decrease? This case study concludes that contracting-out bus services through a bidding process is not enough to ensure company cost-efficiency if public authorities do not implement a well-devised competitive tendering process and do not design an effective regulatory framework. We hope that this study can help policy makers to improve future bidding processes in Brazilian cities and to design an effective regulatory model for the urban bus sector, especially in these days where the media have made known the critical situation endured by the urban poor, which have no conditions to afford the costly fare levels of the public transport services.

1 INTRODUCTION

At the present time the media have publicized the critical situation endured by the poor living in Brazilian metropolitan areas who are deprived of public transport access. The primary cause for this situation is the costly fares, incompatible with the low income of the majority of public travellers, who cannot afford public transport. As a result, the operators unions and some organizations are demanding fiscal subsidies and other federal government special treatment of the services, in order to reduce the fares.

This case study serves to demonstrated that much can be done on the regulatory framework in order to lower fares and improve service quality. The basal assumption is that the most important problem for the currently high public transport fares in Brazil is not the fiscal burden on the inputs for public transport, but the cost-inefficiency of the services provision. According to the modern transport economics literature and the international experience (e.g. the case of London bus systems), if local transport authorities implement an effective regulatory framework, the services will achieve cost-efficiency and consequently low fares.

This paper is divided in three parts. The first one considers the main economic reasons behind the regulation of urban bus public transportation and presents the Brazilian regulatory framework for the services. The second part shows the bidding process occurred in Belo Horizonte during 1997-1998 and its major outcomes. Some recent information is provided about the recent reforms carried out in the system to make it less cost-inefficient. In the third part, some remarks are made about the importance to conduct a well-devised bidding process and an effective economic regulatory framework to achieve cost-efficiency and service-effectiveness of the public transport services.

2 BACKGROUND

In previous research, I analysed the first invitations to bid for urban bus systems in selected cities, carried out pursuant to the new Brazilian legislation of public service concession (see Gomide, 1998). The research was built on a competitive tendering model developed by Orrico Filho *et alii* (1995). One of the tender documents analyzed was from the city of Belo Horizonte. My study showed that the way in which the city's bidding process was defined could not guarantee the introduction of the economical elements to ensure cost-efficiency, as the literature on competitive tendering recommends. The main economical and operational outcomes and the latest consequences of the bidding process occurred during 1997-1998 can now be evaluated with the use of some operational data.

2.1 REGULATORY REASONS AND OBJECTIVES FOR URBAN BUS TRANSPORTATION

According to the economic theory, the reason behind the economic regulation of urban bus public transportation is the perceived failure of markets to generate economically and socially optimal outcomes; *i.e.* when free competition does not

work well. Briefly, some reasons for government economic regulation are (for more details, see Viscusi *et alii*, 1995 or Stiglitz, 2000):

Natural monopoly: Only one firm producing at socially optimal quantity minimizes industry costs; *i.e.* when it is impractical to have more than one supplier in the market (*e.g.* railways and ports).

Sunk costs: when investments in industry are not recoverable because they cannot be converted into other uses or moved elsewhere (*e.g.* underground water pipes and electric wires).

Externalities: when the action of one agent affects negatively or positively the utility or production function of another agent, and the first agent does not care how his behaviour affects the second or does not receive the appropriate incentive (*e.g.* traffic congestion caused by automobiles, negative externality, or public immunization for a disease, positive externality).

Network economies: when coordination is critical to industry's efficiency because the system is a complex set of connections (*e.g.* telephone lines and electricity).

Public goods: when the consumption of a good or service is neither rival – *i.e.* consumption by one user does not reduce the supply available to other users – nor excludable – *i.e.* a user cannot be prevented from consuming (*e.g.* traffic signalling and national security).

Consequently, when market failure occurs – due to natural monopoly, externalities, or some other cause – there is potential rationale for economic regulation.

As Gwillian and Scurfield (1996) demonstrated, urban bus transportation is not a natural monopoly. Urban bus operating costs are highly divisible and bus operation offers little if anything in economies of scale. Besides, there are no sunk costs in bus transportation activity, as the main investment consists in vehicles. The urban bus is both rival and excludable in consumption, so it is not a public good. Hence, the reasons for regulating urban bus transportation are principally the presence of positive externalities and network economies.

A regulated operation system can ensure service coordination and planning, including integrated route structure, coordinated scheduling of services and ticketing, and centralized information supply (*i.e.* the network integrity). As a result, developing a well-designed transport system can have a positive environmental effect, contribute to city economic development and social equity. That is why urban bus transportation requires economic regulation. By controlling entering the market, fare prices, quantity and quality of the services, the government can ensure optimal economic and social outcomes.

Nevertheless, many authors have verified (*e.g.* Baumol *et alii*, 1982; Evans, 1991) that without the pressure of competition regulated firms have a propensity to operate cost-inefficiently (the *x*-inefficiency). Hence, the question is: what kind of competitive pressure could be functional on urban bus transportation? Past experience in Latin American countries proved that free competition among operators (*i.e.* competition in the market) did not lead to lower costs and fares, but

had pernicious consequences for urban environment and industry efficiency (see Thompson, 1992). For that reason, the answer to this impasse is to introduce competition for the market, through a competitive tendering (or competitive bidding) process.

Competitive tender is a bid for a contractual promise to supply a pre-defined service during a pre-determined period of time. The selection of the operator to provide the service is always competitive – this is why this model can be defined as competition *for* the market. The crucial point in deciding which operator will offer the service, within safety and quality parameters, is which one has the lowest operating costs (see Prileszky, 2004). According to Hensher and Brewer (2001), there are two major categories of competitive tender, a cost-only contract and a minimum-subsidy contract. The former involves the tendering authority paying the operator for supplying a specific service. The minimum-subsidy contract requires the contractor to satisfy a service need in return for an obligation from the public authority to provide a subsidy in line with the level of receipts collected. One of the most successful cases for competitive bidding process is the London bus service. In London, assessment of bus service supplier is uncomplicated as the bid price is defined in terms of pounds per bus mile and the contract written in terms of points to be served at specified minimum frequencies and minimum capacities at the various times of day and week. The bidder is permitted to suggest how the specification will be met and can propose vehicle types and sizes. Cox *et alii* (1997) demonstrated that, between 1985 and 1996, London bus services were expanded by 29%; costs per vehicle kilometre fell by 46%; and patronage up by 3%.

As we can perceive, the philosophy of competitive bidding process is to achieve a cost-effective contract-out of services, taking advantage of competition *for* the market under public authority regulation – *i.e.* using market determination of costs as an instrument to achieve cost-efficiency and service effectiveness.

2.2 THE BRAZILIAN REGULATORY FRAMEWORK

Public transportation in Brazil is recognized as an essential service (*i.e.* a merit good), according to the Brazilian Federal Constitution, as it is considered an input into a wider socio-economic framework. Its supply is the responsibility of local governments (cities and states), but it can be delegated to private companies by contract. The public authorities hold the competency to plan and coordinate the supply of services and price setting by means of a specialised local administrative body responsible for the operation of the services. Under contract, the companies maintain their rights to demand the “economic equilibrium” of their operation (Aragão and Brasileiro, 1999). In the majority of cases, fare revenues determined by public administration reward directly contracted companies with no subsidies. However, there are some cities where companies are remunerated by their costs per kilometre to operate pre-defined services and not by fare revenues (a kind of gross cost-based system). In this case, the public authority pays the companies for supplying a specified service with revenues fully transferred to the authority (*e.g.* São Paulo during the nineties). Nevertheless, in the Brazilian case, the operational

costs were not determined by market (*i.e.* by competitive bidding), but administratively, via the standard practice of rate-of-return regulation.

As Aragão and Brasileiro (1999) explained, as a result of the Brazilian public utilities privatization process launched earlier in the nineties, a new legislation on contracting-out public services introduced some changes in contracts established between the public authorities and private companies (the federal law 8.987/1995). The most important changes introduced by the new legislation are: a) companies have to be contracted only by bidding processes (*i.e.* by competition *for* the market); b) companies have to be selected by the lowest fare price, or by the highest monetary offer to government to operate the services, or by a mixed criteria (lowest price and highest monetary offer); c) the contracted companies have to be remunerated by the fare revenues, which can be established by the bidding process; d) companies will not have exclusivity in operating the services; and e) the contracts have to have a pre-determined period of time. In other words, pursuant to the 1995 Brazilian federal legislation of concessions, only a bidding process must contract-out public service supply. It is worth noting that the highest monetary offer selection criterion has not been established for cost-efficiency reasons but fiscal, as the federal government needed to collect money by privatizing public utilities in order to reduce the fiscal debt.

Through establishing competition for the market and giving the option for the public administration to change the way to reward companies – as fares could be defined by the winning proposal of the bidding procedure – the legislation of concessions has introduced powerful instruments to improve the cost-efficiency of public services.

3 THE BIDDING PROCESS AND ITS OUTCOMES

Table 1 shows some city statistics and operational data on the urban bus system and the city of Belo Horizonte.

TABLE 1
Belo Horizonte - city statistics and urban system data, 2002

Items	Figures*
Population (millions)	2
Area (sq. km)	330
Passengers per day (millions)	1.6
Bus lines	300
Operators (companies)	49
Vehicles (thousands of buses)	2,9

Source: PBH/BHTRANS.

Obs.: *Rough estimate.

The bidding process in Belo Horizonte occurred during 1997-1998 and covered the whole urban bus system. The bidding invitation was a requirement of the Court of Accounts of the State of Minas Gerais. At that time, the current operators had not even gone through a procurement procedure – actually, they had “inherited” their permission to operate before, from former companies (“grandfather’s rights”). Hence,

it was the first Brazilian urban bus bidding procedure after the introduction of the new federal legislation of concessions. For these reasons, the bidding process did not happen smoothly; in fact, it took place with a strong legal battle between the incumbents and the public transport authority (Siqueira e Cançado, 2000).

The object of the bid was not a bus route, but a given number of vehicles to operate the public transport network, specified, planned and coordinated by the local public transport authority (BHTRANS). Each set of vehicles, 83 in all, was comprised of 18 to 52 buses – 2.8 thousand buses. There was no exclusivity in the operation of areas or routes and each company was allowed to hold up to 5% of the total fleet in operation. The companies were selected by the highest money offer to the local government to operate pre-defined services. The revenue collected by the bidding process would be transferred to the Municipal Public Transport Fund, and used for infrastructure investments.

Companies were to be remunerated for their estimated costs per kilometre to operate the services specified, planned and controlled by BHTRANS, taking into consideration the number of vehicles used and the total number of kilometres covered. The operational costs would be calculated on the grounds of an accounting equation to estimate the companies' operational costs plus the allowed rate of return (12% per year), calculated on the basis of the valued company investments in vehicles – *i.e.* the remuneration model was based on the standard practice of rate-of-return regulation (for more details about the rate-of-return regulation, see Viscusi *et alii* 1995). BHTRANS should evaluate the services carried out by the operators, compare them with the services specified, and remunerate the operators according to the accounting equation. No subsidies were allowed to remunerate companies. The equation and its parameters were established in the tender documents.

The account equation and its cost parameters have their origins earlier in the eighties, when the Brazilian federal government established the rate-of-return regulation (or the cost-plus model) to reward urban bus companies. Roughly, the accounting equation describes the following process (Viscusi *et alii* 1995, p. 378):

$$\sum_{i=1}^n p_i q_i = \text{operating costs} + s(V)$$

Where

p_i = fare price of the i th service

q_i = quantity of the i th service (or passengers transported)

n = number of services (vehicle kilometres)

s = allowed rate of return (12% per year)

V = the rate base, calculated on the basis of the valued company investments in vehicles.

Notice that according to the remuneration model, companies would not take any revenue risk, as all on-bus revenues were managed by BHTRANS, through a clearinghouse. The contracts were signed for a period of ten years.

As may be observed, the criterion used to contract out operators (*i.e.* the highest monetary offer to government to operate the services) does not choose the more efficient ones, but those which can afford to pay the public authority a larger amount of money – the bidding selection criterion in Belo Horizonte was concerned about getting fiscal resources. Besides, the method to reward the companies for estimated operational costs per kilometre does not encourage operators to be cost-efficient; actually, if operators work efficiently, they may see their revenues shrink, as their total remuneration will decrease – notice that economically efficient prices are not required by the rate-of-return equation, only prices that cover total costs. On the other hand, the technical efficiency gains of the more productive companies are not transferred to users, but are retained by these operators, once costs are calculated on the basis of the average costs system estimated by the public authority.

In addition, contracts are signed for ten years. Such a long period leads to a weakness in the mechanism of competitive pressure, as incumbents do not suffer the effects of potential competition (in London, for example, contracts, where the operators are required, in some cases, to provide new buses, extend only to five years).

The contracts do not require performance criteria or standards as an instrument to improve service effectiveness and quality for users. Besides, there are no operational targets to be achieved as a mechanism to improve operators' service-effectiveness (*i.e.* by benchmarking or yardstick regulation). The regulatory model did not introduce any kind of performance measures to provide a threat to operators via the revision that occurs to price and quality controls as a consequence of improved practices in the industry. Table 2 shows the main characteristics for the Belo Horizonte tender documents.

TABLE 2
Main characteristics of the Belo Horizonte tender documents, 1997

Item	Characteristics
1. Object	A set of vehicles to operate the public transport network planned and co-ordinated by the BHTRANS.
2. Criterion for selection	Bidder with the highest money offer to the local government to operate a given set of vehicles.
3. Remuneration model	Companies are remunerated for their estimated operational costs per kilometre to operate the services specified by BHTRANS, taking into consideration the number of vehicles used and the total number of kilometres covered (<i>i.e.</i> by the rate-of-return regulation)
4. Period of contracts	Ten years
5. Instruments to improve service effectiveness and quality	None

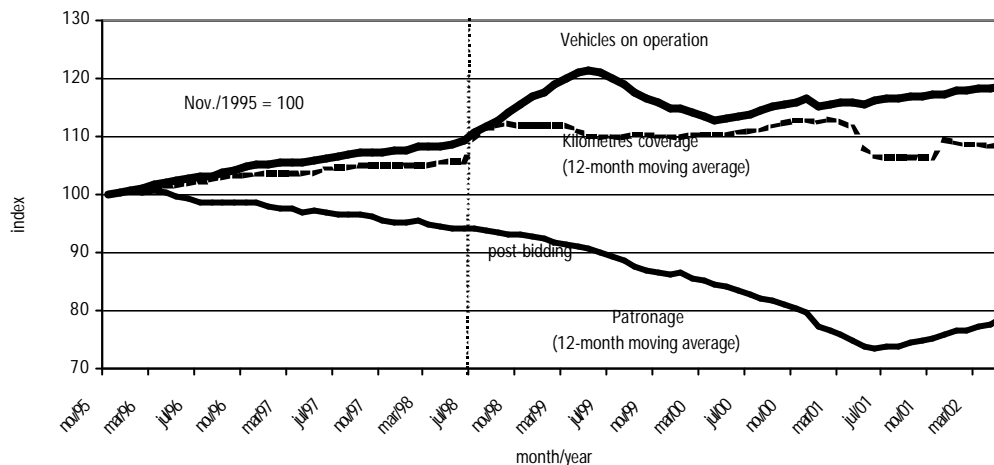
Source: Adapte from Gomide (1998).

3.1 MAJOR RESULTS

The bidding process was not effective enough to renew the incumbent companies: from 47 operators who won the bidding process, only 2 groups were newcomers (Siqueira and Cançado, 2000).

The new regulatory model did not succeed in promoting the industry's economic efficiency as well. In spite of patronage-decreasing trend since 1996, kilometres coverage and the number of vehicles in operation have increased after the bidding process was finalised (see figure 1).

FIGURE 1
Belo Horizonte - kilometres coverage, vehicles on operation, and patronage behaviour 1995-2002

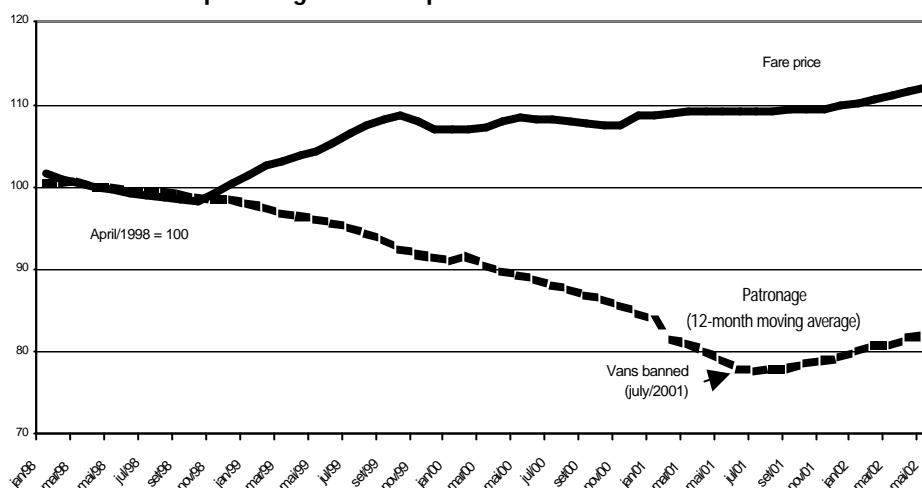


Source: PBH/BHTRANS.

Figure 1 shows that immediately after the contracts had been signed (between January and June of 1998), the number of vehicles used and the total of kilometres covered increased considerably – BHTRANS created more routes responding spontaneously to public traveller's new demands. As companies are remunerated for the number of vehicles used and the total of kilometres covered, they accepted the increase at service level without any resistance – it was not in the interests of the operators to filter out unnecessary routes and BHTRANS had difficulty acquiring these information. Nevertheless, the increase in service levels has not been accompanied by an increase in revenue. As Hensher and Brewer (2001) demonstrated, under a contract where restrictions are imposed by the public transport authority on prices and service levels, it is difficult to pass the real risk for revenue to the contractor. The desire to establish a centrally determined price and service levels policy is incentive incompatible – it may give the operators inadequate incentives to collect revenues. That was what happened in Belo Horizonte.

To keep the urban system running financially balanced, in a patronage-decreasing scenario, BHTRANS had to boost fares (as no subsidies were allowed to remunerate companies). It made some operational adjustments by reducing the service level after 1999 (*i.e.* the amount of vehicles kilometres in operation). From *January* 1998 to *May* 2002, fare prices increased about 12%, considering inflation rates (inflater used IGP-DI), while patronage decreased 18% (figure 2).

FIGURE 2
Belo Horizonte – patronage and fare price behaviour 1998-2002



Source: PBH/BHTRANS.

Notes: Inflatior used IGP-DI; 12-months moving average.

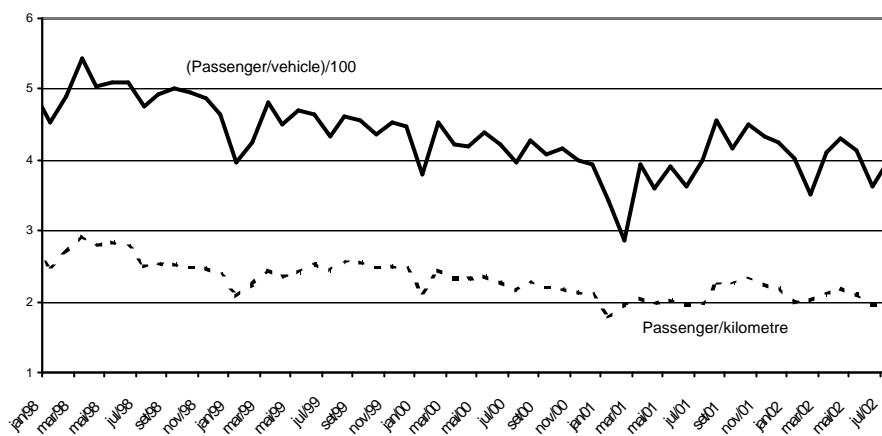
Since 1996, urban bus patronage in Brazilian cities has had a decreasing trend. Several factors can be pointed out in order to explain this trend. They range from the fall in *per capita* income to the decrease of the number of workers eligible to receive the *vale-transporte* (a direct subsidy employers are required by federal law to provide their employees with a wage subsidy covering any amount above 6% whenever the total cost of monthly “home to work” public transport trips exceeds 6% of their salaries), as unemployment rates rose significantly following the Brazilian macroeconomic stabilization programme. However, the effect of the considerable incursion of informal operators into the public transport market cannot be ignored. As Santos *et alii* (2001) described, since the mid-90’s Brazil has witnessed the emergence of an informal urban transport, which has challenged the regulatory barriers imposed by public authorities. Belo Horizonte was not an exception. The new users’ needs and the relatively expensive fares practiced by operators have left plenty of room for alternative services. As a result, the Belo Horizonte urban bus system suffered strong pressure from van operators, who contested the public transport market.

Nevertheless, that process did not develop without any trouble. Incumbent operators and BHTRANS reacted vigorously and vans were banned from the streets in mid-2001. This course of action helps to explain the patronage-decreasing behaviour but not entirely. As figure 2 demonstrates, after vans were banned (July 2002), the demand rose slightly but not at the same levels as in 1998.

In the Belo Horizonte bus system, once operational costs have increased while revenue has decreased the system economic equilibrium has worsened. Consequently, service productivity, measured in passenger per kilometre and passenger per vehicle, decreased significantly. Figure 3 shows that passenger per vehicle and passenger per kilometre indicators decreased around 20% and 25% respectively, between 1998 and 2002. As a result, the system’s financial situation has gotten worse. Estimated costs surpassed actual revenues and the local public transport authority had no funds to subsidise the system. As a result, toward the end of 2002, BHTRANS faced financial complications.

FIGURE 3

Belo Horizonte's urban system performance indicators – 1998-2002



Source: PBH/BHTRANS.

Notes: Inflation used IGP-DI; 12-months moving average.

3.2 REFORMS TO THE SYSTEM OF REGULATION

Since mid-2003, the city has been undertaking reforms to make the urban bus system less cost-ineffective. The main objectives of the changes are to reduce operational costs (*i.e.* vehicle kilometres) and increase revenue.

The remuneration model was modified to work with targets, bonus and penalties. For each route there is an estimated average cost per passenger, the target, agreed with BHTRANS and the operators. If the operator surpasses the target, by carrying more patrons than forecasted by BHTRANS or reducing their costs (*i.e.* vehicle kilometres), he or she holds fifty percent of the “extra” revenue. The other fifty goes to cover the system accumulated financial deficits. Conversely, if the operator goes below the target, he or she will hold the losses alone. On the other hand, operators obtained flexibility to design their own end-service supply, under a set of minimum service levels (e.g. vehicle types, capacities, and frequencies at various times of day and week). Notice that the average costs per passenger are still estimated by the rate-of-return equation, but the remuneration system is different now from the former, as the risk for revenue is passed to the service provider.

Even though it is too early to assess their impacts, some results of the changes can be pointed out. According to the BHTRANS (2004), the revenue-decreasing trend has ceased; estimated costs decreased and, for the first time since 1999, the system indicated cost-recovery (*i.e.* monthly revenue surpasses estimated costs). In contrast, as public-travellers complaints have increased significantly since the reforms, service level has worsened. This outcome shows that the system's regulatory philosophy is still concerned with controlling the operator's operational processes (*i.e.* vehicles kilometres) and not the service-effectiveness for the public-travellers (*i.e.* accessibility, affordability, and availability of the services).

At the moment, BHTRANS is still promoting changes in the way to plan and coordinate the services. Some studies have been put on course to develop a new public transport network (based on region units), integrate ticketing, and create different fares

for the various times of day and weekend. In one or two more years we will be able to assess how well those reforms perform in the Belo Horizonte regulatory model.

4 CONCLUDING REMARKS

In spite of the fact that the federal legislation of contracting-out public services has introduced instruments to promote the competition for the market and to improve cost-efficiency of urban bus services, the bidding process carried out in Belo Horizonte did not have that effect. As I have shown, the rationale of competitive tendering is market determination of costs (*i.e.* by bidding procedure deciding which operator has the lowest operating costs). The Belo Horizonte's bidding selection criterion (*i.e.* the highest price offer to the government) and remuneration model adopted (*i.e.* the rate-of-return regulation) did not address this. On the contrary, the remuneration model involved administrative cost determination and the selection criterion used limited the competition for the market. Moreover, the regulatory framework did not require instruments to stimulate the operators to collect revenue and to improve service quality.

This case study shows that contracting-out bus services through a bidding process is not enough to ensure company cost-efficiency if public authorities do not implement a well-devised competitive tendering process and do not design an effective regulatory framework.

The regulatory system adopted in Belo Horizonte (a kind of gross cost-based contract with rate-of-return regulation) was developed in Brazil in the eighties. The proposal was that public transport authority has total control over public transport provision, quality and prices, as operators were paid to supply a pre-defined service. However, the desire to establish a strict centrally determined service policy gives operators no incentive to increase revenue, as the public authority accepts the income risk. Furthermore, the remuneration model adopted in Brazil (*i.e.* the rate-of-return regulation) provides operators inadequate motivation to operate cost-efficiently. These situations in a government fiscal crisis and in a patronage-decreasing scenario, like the current circumstances we have in Brazil, are critical, as the local governments cannot subsidize the public transport.

These remarks serve to demonstrate that bidding public processes are not just a legal matter but an economic issue as well. It seems that the Belo Horizonte bidding process was dealt by BHTRANS merely as a legal issue, as incumbent operators had not even gone through a procurement procedure, instead of taking the opportunity to treat it as a means to ensure optimal social and economic outcomes. It cannot be denied that the Belo Horizonte bidding process is remarkable for the Brazilian experience. The city was the first to conduct a bidding process covering the entire bus system. Nevertheless, we must learn from this valuable experience.

We hope this case study can help pundits and policy makers to improve future bidding processes in Brazilian cities and to design an effective regulatory model for the urban bus sector.

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