

The Experience of Reforming Bus Concessions in Santiago de Chile

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Introducing Santiago de Chile

The city of Santiago is the capital of Chile and the urban core of the Santiago Metropolitan Region (SMR), the most densely populated region of the country, with over 6.1 million inhabitants¹ spread over 1 400 square kilometres (INE, 2017). With a Gross Domestic Product (GDP) exceeding 93 billion dollars, which is expected to double by 2025, Santiago is among the world's 75 most dynamic cities, as well as being classified as the third city in South America for best quality of life, the second best city in which to do business and the safest one in Latin America (Mercer, 2016; América Economía, 2016; Master Card Global Centers of Commerce, 2008).

Regarding the administration of the territory, the metropolitan region is led by the regional government, which is headed by the regional intendant and the regional council. Its territory is organised into six provinces that group 52 autonomous districts with democratically elected authorities (mayors). A total of 34 of these districts correspond to the SMR and eighteen to the more rural surrounding areas. The administrative power of the regional government is very limited meaning that Santiago still lacks a metropolitan authority which oversees and plans for the whole territory. This sometimes causes difficulties in coordinating and implementing policies and programmes at a metropolitan level.

Figure 1. Santiago Metropolitan Region



Source: IRM (2017).

In a city like Santiago, which has grown in size² in a fragmented way, it is essential to have a smart, robust and well-planned transport network system that integrates the different uses of the territory, thus minimising the negative externalities of infrastructure and degraded urban spaces. This is the primary objective of Santiago's public transport system, which is mainly structured around Transantiago³, an integrated system that includes bus services, provided by private operators through concessions, and a subway network operated by a state-owned company, along with suburban train services connecting with suburbs and intermediate cities in the south (Metrotren and Metrotren Nos).

However, the efficiency and quality of the system has been questioned since its inception, despite the improvements that have been evidenced lately. In general, the travel experience is usually qualified as

negative by users. In addition, significant fare evasion has contributed (among other reasons) to the need for unplanned additional subsidies by the state, obtained through special laws (Figueroa, 2013). This is all within the framework of the services provided by the Transantiago bus concessionaires who operate the system's routes and which are periodically awarded through public bids managed by the state. Thus, the bus concession system of Transantiago is key in the analysis of the system and in particular in the provision of public transport services.

Public transport history

Since the beginning of the 20th century, Santiago's public transport system has experienced clearly identifiable periods in terms of its modes of management and the policies that defined it. Between the 1920s and 1930s, the public transport system shifted from a large private and foreign tramway company, almost monopolistic and with weak regulations, to a proliferation of smaller groups of local entrepreneurs, who had one or a few rather precarious transport units, but with great agility and reaction capacity, which gave rise to the (quite well known in Chile) profession of independent bus operators (Errázuriz, 2010). They were organised early on into associations that grouped all operators working a single line, and which defined the routes, frequencies and stops, thus developing the essence of professional self-regulation.

The expansion of bus services and the subsequent tramway crisis led to the consolidation of urban bus transport in the 1950s and, consequently, to the establishment of mechanisms for the public regulation of its operations. Each association was granted an operating concession and quotas were established for the vehicles to operate the routes, based on the operators' own definitions. At the same time, the State Public Transport Company (ETC) was created aiming to establish the conditions needed for regulating bus services, including fares that were tightly controlled by the state, together with the definition of the level of service to be imposed on operators, albeit in a rather lax manner in practice (Figueroa, n.d.).

This model prevailed until the mid-1970s, through Allende's government and continuing after the military coup of 1973. Against this background, and under the influence of the liberal policies that had prevailed at a national level since 1973, mass public transport was completely liberalised in 1979, with a shift of focus from level of service to market variables (Darbéra, 1993). This established the freedom to define routes, frequencies and fares by the bus operators, giving birth to the system of the, informally called, "Coloured buses". The then government relied on the premise that the supply of services and their quality would be efficient since operators had incentives (and freedom) to satisfy demand, and that the competition would force the operators to charge a competitive fare (Thomson, 1992).

The liberalisation of the system enabled an increasing supply (see Table 1), thus benefiting users thanks to a denser bus network and decreased waiting times. However, it also increased congestion, environmental pollution and fares, along with a low average occupancy rate of buses. Moreover, competition for passengers became a big issue in the main avenues of the city, where several routes would overlap and buses would race to catch passengers, generating an unsafe and aggressive environment. In summary, the unregulated bus system featured small, low quality, poorly maintained buses, poorly paid drivers racing for passengers (since their salary was directly proportional to the number of tickets sold), high fares and a lot of uncertainty regarding the regularity of the system (Figueroa and Orellana, 2007).

Table 1. Evolution of vehicle fleet for bus public transport, 1977-1989

Year	Buses	Taxi buses ⁴	Total
1977	3244	1516	4760
1981	3964	2117	6081
1985	5581	3072	8653
1989	6378	4164	10542

Source: Figueroa (1990).

In 1990, a new regulatory structure was established, re-introducing a more active role for the state and attempting to rescue aspects where the market is expected to contribute and those where public regulation must address market failures. This led to a profound change in the regulatory and legal framework, with the introduction of the principle of open, public and competitive tendering, established as a mechanism for the allocation of fixed-term concessions with a maximum fleet size, thus limiting the route capacity (Fernández, 1994; Wityk, Dourthé and Malbrán, 1998). The contracts for the concession fixed the routes, the minimum frequency that each service had to provide within the regulated area, the maximum age of the vehicles, their capacity and a formula to readjust fares that followed the variation of the main supply prices (Velasco, Gómez-Lobo and Díaz, 2004). Under this system, up to 8 997 buses comprised the total fleet for Santiago in 1998 (MTT, 1998), although many of the routes were very similar to those of the “Coloured Buses”.

This new franchised public transport system was popularly known as the “Yellow Buses”, consolidating itself as the public transport system of the city of Santiago during the last decade of the 20th century and early 2000s.

The initial outcomes of the regulation included an improvement in bus quality, a decrease in their number and a slight drop in the fare. Also, the stricter regulations regarding the quality of the buses substantially improved the quality of the service and the economic efficiency (Fernández, 1994). However, on-street competition remained a fact, even between buses of the same service, as each bus owner managed its own revenues independently, which were affected by the high level of overlap between the network's routes on the central axis of Santiago. This resulted in uncertainty in waiting and travel times, undignified treatment of passengers and a high accident rate⁵, as well as poor bus maintenance, leading to a high level of emissions and noise pollution. Another problem of this system was its high operating costs due to long and inefficient bus routes. This was due to the competition between operators for concessions when bidding for certain routes, leading to the overlapping of routes in the main avenues of the city and thus generating significant congestion. According to Malbrán (2001), 80% of the bus routes passed through one of the city's six central axes. The result was excessive supply, excess frequency outside peak hours and limited night services, as operators' profits were strictly dependent on demand (Velasco, Gómez-Lobo and Díaz, 2004; Gschwender, 2005).

Design and implementation of Transantiago

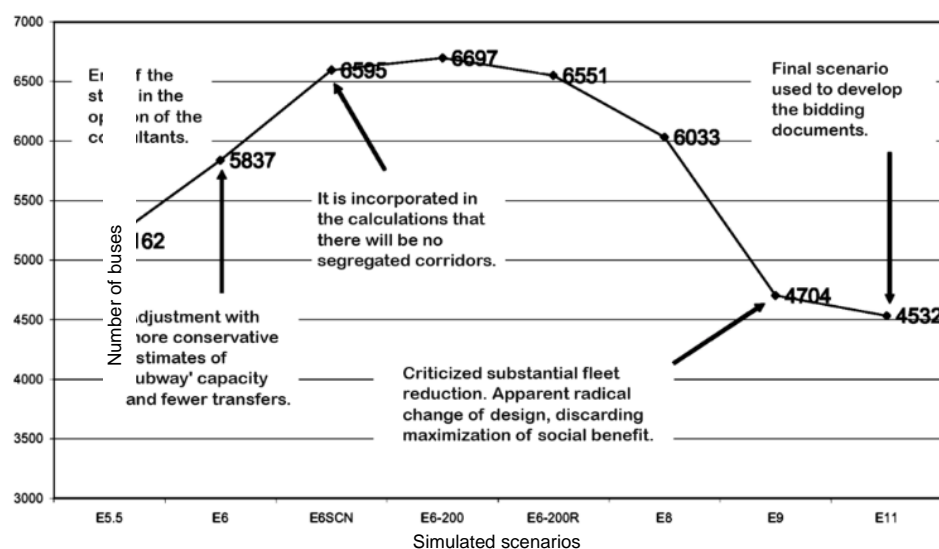
As a response to the problems outlined above, along with the need to meet the upcoming challenges of a city growing both in population and income, the Santiago Urban Transport Plan (PTUS⁶) emerged, outlining the main guidelines for the development of Santiago's public transport. Under this blueprint, the Government of Chile decided to modernise and restructure Santiago's entire public transport system, integrating the well-reputed but barely used underground system (Metro) and the private bus networks, based on a structure of trunk and feeder services, and an integrated fare payment by contactless smart cards, originally using *Transmilenio* and Curitiba's BRT as inspiration (Muñoz and Gschwender, 2008). This design was intended to minimise on-street competition and confine it to the bidding process, where all participants had to be registered corporations (forcing individual bus owners to organise themselves into companies and potentially attracting foreign operators). One of the key features of the original plan was the assumption that the system would be self-financed through collected fares (like the yellow buses were).

This new system, called Transantiago, was conceived in 2002 by the government of Ricardo Lagos. The plan involved dividing Santiago into five trunk units that grouped different areas according to geographical criteria, with services using high-capacity articulated buses running on the main arteries of Santiago, as well as ten zones, with feeder buses that served each of them and placing the Metro as the backbone of the entire public transport system (Muñoz and Gschwender, 2008). It also involved the implementation of a financial and technology management unit (AFT), that would generate and process information for fleet control and distribution of payments between units.

The service structure, fleet and frequencies were determined through the use of the DIRT⁷ software, especially developed by the Secretary of Transport Planning (SECTRA). The software combined advanced heuristic-based methodologies for route design, deterministic traffic assignment and strategic demand models (Malbrán et al., 2004). The construction and evaluation of scenarios was contracted to a consultant, with several iterations taking place as new information became available. In this process, the estimate of the size of the required bus fleet⁸ increased from an initial value of 5 162 to 6 697, in a scenario that worked under the (significantly more realistic) assumption that bus corridors would not be available. However, for reasons that are still not clear, further scenarios (most likely drastically reducing the level of service and increasing maximum passenger density) estimated the required fleet at 4 704 buses (see Figure 2). The call for bids was made based on 4 532 buses, a number that seemingly made it possible to fulfil the “assumption” (or requirement) of having a self-financing system (Quijada et al., 2007).

This very low number of buses is considered one of the main reasons for the failure of Transantiago at its launch, since it was impossible to provide a level of service even remotely close to the one provided by the previous system with such a limited number of vehicles. It is notable that, currently, the Transantiago fleet comprises around 6 500 buses, very close to the number estimated for the more realistic scenarios that were explored during its design.

Figure 2. Projections of required bus fleet according to reports prior to preparation of bidding documents



Source: Quijada et al. (2007).

Key features of the bidding process of Transantiago

According to Muñoz and Gschwender (2008), the terms of this bidding process stated that a single bidder could be awarded a maximum of two trunk units, with a maximum of four zones in total. Each bidder was required to specify the fare per passenger in the units for which it was bidding, based on the required level of service set out in the terms of reference. These fares were delimited by a lower limit that ensured the seriousness of the bid and an upper limit that guaranteed control over the costs of the system. However, due to the narrow range of valid bids, practically all units were awarded at the lower limit of the range. In the event of a tie between two bidders, the final decision was made on the basis of three factors: a direct contribution to the system's compensation fund (declared by the bidder); the expenditure per driver on salaries and employee benefits; and a specific number of additional kilometres to be undertaken by the operator (the latter only in the case of trunk services). Thus, for both trunk and feeder units, this contribution to the system was of approximately USD 180 million (Muñoz and Gschwender, 2008).

Twenty-five companies participated in the bidding process (seven of them from other countries) and 45 bids were received (11 for trunk services and 34 for feeders). The companies that were awarded the operation of the new units were announced in early 2005. This included the ten feeder units and the five trunk units. These are listed below in Table 2.

Table 2. Awarded companies and contract period for trunk and feeder zones.

Zone	Operator	Nº of services	Nº of vehicles	Contract Period
Trunk 1	Inversiones Alsacia S.A.	27	628	2007-13
Trunk 2	Subus Chile S.A.	43	1022	2007-20
Trunk 3	Buses Gran Santiago S.A. (2007 – 2009) Buses Vule S.A. (2009 – 2012)	15	400	2007-13
Trunk 4	Express de Santiago Uno S.A.	41	1020	2007-20
Trunk 5	Buses Metropolitana S.A.	19	727	2007-13
Feeder A	Served by trunk units			
Feeder B	Buses Gran Santiago S.A. (2007 – 2011) Redbus Urbano S.A. (2011 – 2012)	30	246	2007-12
Feeder C	Redbus Urbano S.A.	26	295	2007-12
Feeder D	STP Santiago S.A.	21	199	2007-12
Feeder E	Unión del Transporte S.A.	20	215	2007-12
Feeder F	STP Santiago S.A.	27	402	2007-12
Feeder G	Buses Gran Santiago S.A. (2007 – 2009) Las Araucarias S.A. (2009 – 2012)	20	289	2007-12
Feeder H	TransAraucarias S.A. (2007 – 2010) Buses Gran Santiago S.A.(2010 – 2011) Buses Vule S.A. (2011-2012)	17	177	2007-12
Feeder I	Comercial Nuevo Milenio S.A.	25	407	2007-12
Feeder J	Comercial Nuevo Milenio S.A.	27	279	2007-12

Source: Directorio de Transporte Público Metropolitano (2012).

The bid for the role of financial and technology manager (AFT), responsible for managing the system's funds and distributing them among operators twice a month, was won by a consortium that brought together Chile's four largest banks, the country's largest retailer and one of its largest and most respected technology companies. Also, the widespread introduction of the contactless smart card was attractive to local banks, which saw it as an opportunity to offer financial services and reach larger numbers of people, many of whom had no other banking products due to their low income (Muñoz and Gschwender, 2008). Finally, the implementation and operation of the information system (required as input by the AFT) was tendered separately and, after a significant delay, was assigned to a conglomerate led by a large Indian company. With this, the government announced that the bidding process had been successfully concluded (Emol, 2005).

Implementation of Transantiago: The “big bang”

Transantiago sought to provide a modern, sustainable and integrated public transport system for the entire city. However, this new model ultimately led to one of Chile's biggest public policy failures (Figueroa, 2013).

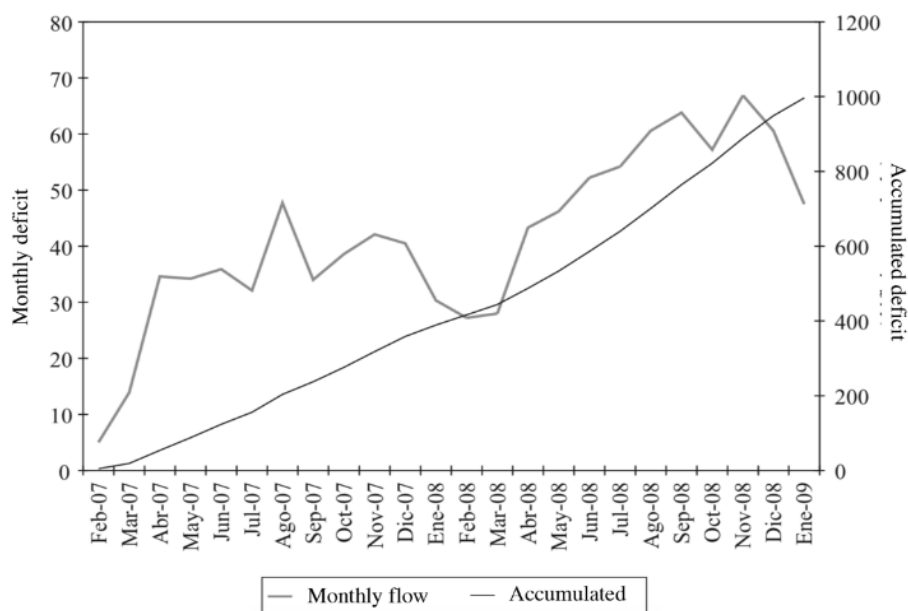
Since its formation, it was clear that one of the main concerns of the designers of the system was to make it attractive for private firms, ensuring enough competitors in the tender and therefore (in theory) obtaining the best possible result (a “successful tender”). This is reflected in several aspects of the contracts that seem to directly benefit the entrepreneurs winning the bid. Specifically, from the analysis of the bidding bases presented above, it is observed that the main goal was to provide security to investors, neglecting key level of service aspects (De Gregorio et al., 2017). This issue was reflected in different deficiencies in service provision.

The start of operations, according to Gomez-Lobo (2007), was initially planned for an earlier date of October 2006. However, due to the AFT's delay in delivering the payment and fleet management system, the start had to be postponed until 10 February 2007. Consequently, the authority had to renegotiate the contracts with all the operators, reaching an agreement where it was decided to compensate the operators for the higher costs implied by the new start date. Yet, one day before the new date, given that the AFT had still not delivered its systems, it was agreed by the different stakeholders that, between 10 February and 5 May 2007, payment to operators would be based on the reference level of demand contained in the contract. This meant each operator's revenue would be a fixed amount, regardless of the number of passengers transported and the size of the fleet actually in operation. As revenues remained fixed, and costs could be reduced by decreasing frequencies, the incentives faced by operators to comply with their operational programme decreased dramatically.

The first months of operation of the new system were chaotic, as outlined by Mardones (2008) and Briones (2009). First, since the payment system was not operational, authorities decided to decree a zero fare throughout the system, financed in part by the guarantee ballots charged to the AFT, probably contributing to normalising the idea of not paying for the services and setting the stage for the significant levels of evasion observed in the system. Second, the reorganisation of the network generated the need for new (and quite unpopular) transfers to complete trips and revealed areas without coverage, especially on the city's fringes, where new real estate developments emerged between the time when the new network was designed and when it went into operation. Third, given the poor incentives, the bus supply was insufficient, leading to a substantial increase in waiting and travel times, along with notorious congestion at bus stops. Fourth, there was a significant increase in the number of passengers transported by the Metro, an increase that, although foreseen, was substantially higher than the one projected by the initial demand models. All of the above, implemented in a single, overnight step, gave rise to the so-called “big bang” of February 10, 2007.

Despite these problems, not everything about the implementation of Transantiago was negative. One of the main achievements of this system was to eliminate competition on the streets and thus the aggressive and dangerous way of driving that characterised the old system. It also improved travel conditions for students, who were discriminated against by drivers in the previous system (due to the lower fare they paid). Likewise, it is recognised that the aim of increasing the use of the Metro and allowing more equitable access to this mode of transport was achieved with the implementation of Transantiago (Briones, 2009). However, there is no doubt that Transantiago was failing to deliver the efficient and modern transport service that was promised. Indeed, in addition to its weaknesses, the system's financial deficit, which reached about USD 25 million a month⁹, also became a critical issue in future years (see Figure 3).

Figure 3. Transantiago's operational deficit



Source: Adapted from Briones (2009).

Original contracts and incentive model

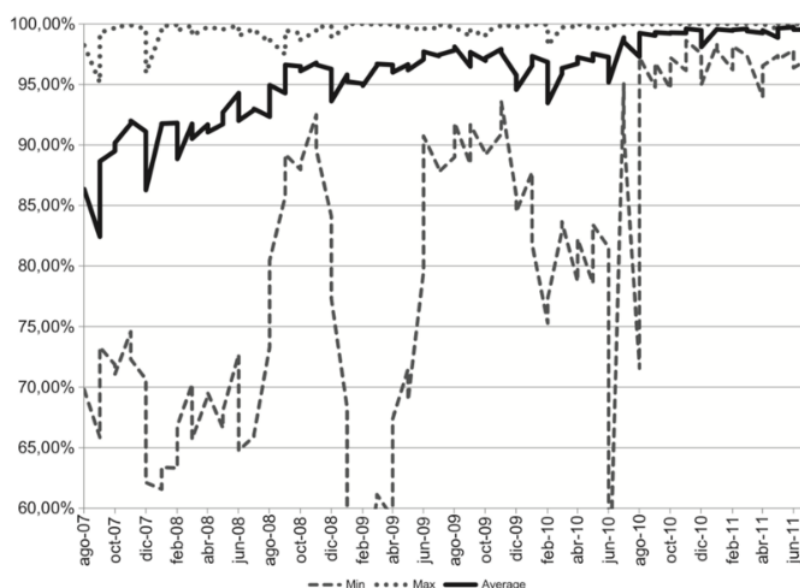
The design flaws that became evident after the implementation of the original Transantiago plan are not primarily related to the routes, but to errors in the design of the contracts (Briones, 2009). Indeed, the original contracts were intended to provide a low-risk operation in which changes in the number of users would have a minimal effect on the revenues received by the companies. To this end, it was established that if the effective demand was lower than the reference demand, the fare would rise in such a way as to guarantee 90% of the revenues that the contractor would receive if the offered fare were combined with the reference demand. This very high guaranteed minimum income generated a series of distortions in the market, including the disincentive for operators to run their buses, the disincentive to adapt or extend routes, and an increase in the volatility of the services. In addition, very inflexible contracts were agreed with each of the operators, which allowed the authority very limited room to intervene in the event of serious problems, such as those that arose in practice. The contracts specified fines and deductions of income for operators that did not provide the services as specified, and that once an operator accumulated a given number of fines his contract would expire. However, in practice, operators were “too big to fail”, so that cancellation of their contracts could not be used as a means to improve system performance. Thus, the fines were fruitless and the authority was not able to use one of its main intervention tools to enforce the operational plan.

Responding to the issues that emerged in the early years of Transantiago, several measures were developed by the authority to change the incentives faced by operators, in order to improve compliance with operational programmes and achieve better service levels.

As the number of buses in operation was significantly lower than planned, the authority decided to modify the contracts, and introduced an index based on the number of buses in operation, which would have an

impact on operators' revenues. It was constructed based on the aggregate number of seating places offered by an operator for all its services, or the seating time compliance index (ICPH), which was calculated simply as the number of buses operating every half hour multiplied by their capacity, and divided by the theoretical figure indicated in the operating programme (Gómez-Lobo and Briones, 2014). This index eventually became a percentage for each company in each revenue calculation, i.e. the actual revenue paid to each operator was the product of the index and the theoretical revenue. As seen in Figure 4, the average ICPH increased from 0.85 in September 2007 to 0.99 in March 2011 (Beltrán, Gschwender and Palma, 2013).

Figure 4. Evolution of the average seating time compliance index (ICPH)

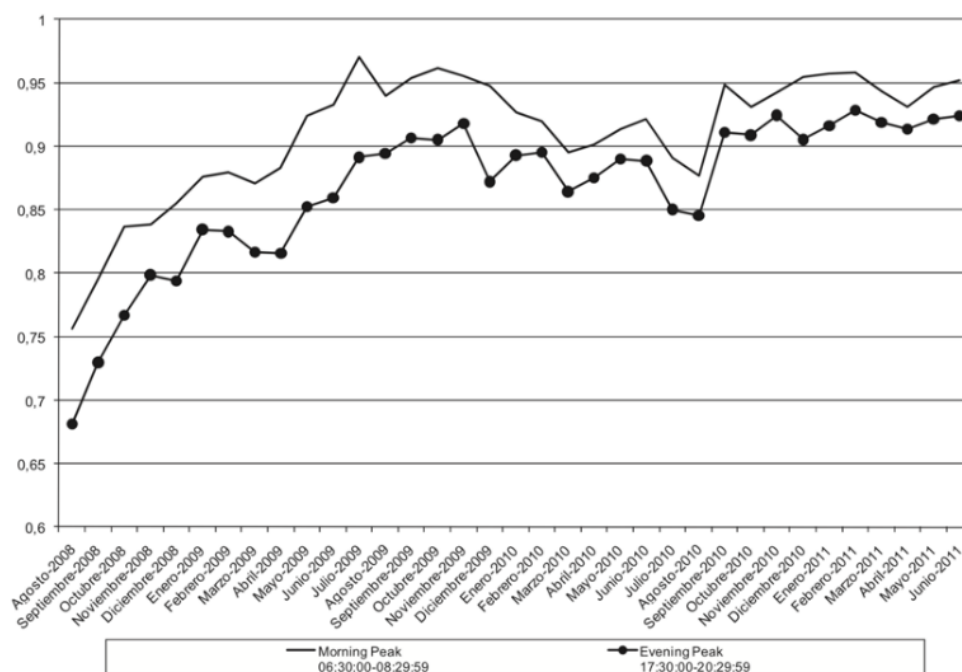


Source: Beltrán (2013).

Despite the adoption of the ICPH index, operation was still far from optimal, as there was still the possibility for a single company to operate more buses on a high-demand service and fewer buses on other services, reaching the desired total number of buses in operation at the company-wide level. Therefore, additional compliance measures were needed to improve adherence to the operational programmes and service quality. Eventually, Transantiago modified the ICPH to capture not only offered passenger capacity, but also the actual bus kilometres travelled. This new indicator was called ICPKH and was calculated for each service in all directions. Like the ICPH, the ICPKH is linked to the revenues received by operators (Muñoz, Batarce and Hidalgo, 2014).

Another indicator was also constructed to ensure that programmed service frequencies were met in practice. This is a very simple index, called the frequency index (ICF) which was defined as the percentage of programmed bus trips actually offered (Muñoz, Batarce and Hidalgo, 2014). The ICF measured in the morning peak period increased from 0.75 in August 2008 to 0.95 in June 2011 once it was incorporated into the contracts (Beltrán, Gschwender and Palma, 2013).

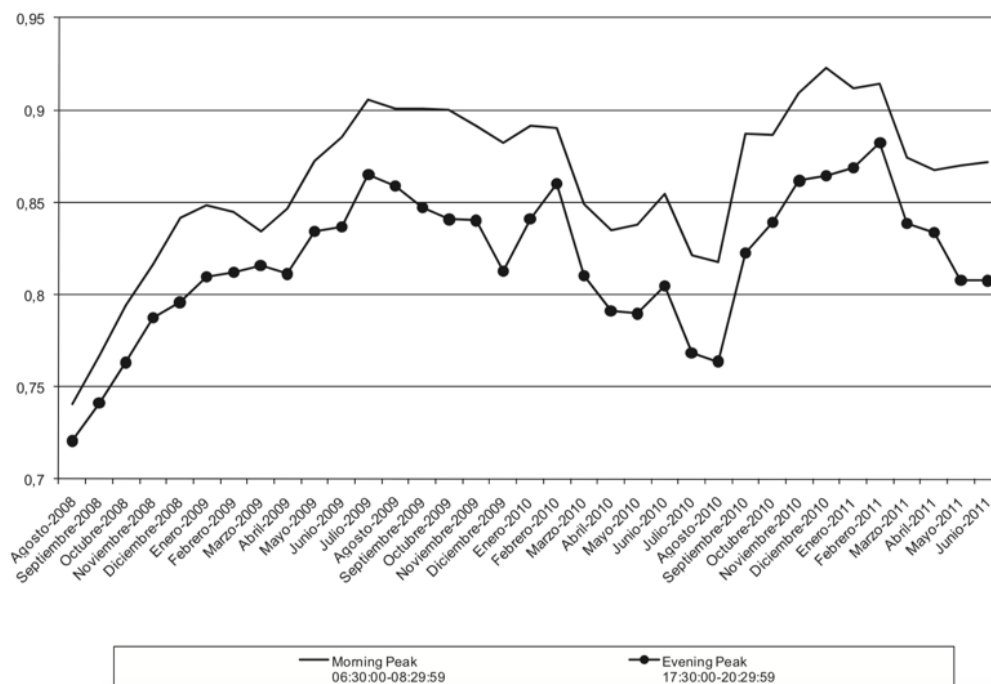
Figure 5. Evolution of the average frequency index (ICF) during weekday peak periods



Source: Beltrán (2013).

Yet another indicator was needed to complement the ICF and ICPKH, as these did not take into account the regularity of the headway between buses. This is how the regularity compliance index (ICR) emerged as an additional incentive to avoid buses being dispatched with too great a headway. It is based on the coefficient of variation (CV) of the headways observed in a period of service. The CV is transformed into an index between 0 (minimum) when the CV exceeds 1.5, indicating that the headway variability is large, and 1 (maximum) when the CV is lower than 0.4, meaning little variability across bus headways (Muñoz, Batarce and Hidalgo, 2014). The ICR measured on the morning peak changed with volatility from 0.74 in August 2008 to 0.83 in June 2011 (Beltrán, Gschwender and Palma, 2013).

Figure 6. Evolution of the average regularity compliance index (ICR) during weekday peak periods



Source: Beltrán (2013).

The above indicators have had a real impact on operators' performance. The ICPH family, the ICF and the ICR have all influenced service performance and quality. However, according to Beltrán (2013), the design and implementation of all these compliance measures in a large bus system such as Transantiago is not possible without adequate automatic information and tools, which initially did not exist in the system. In fact, the absence of GPS¹⁰ and fleet management tools made it impossible to implement and assess performance against these indexes at the beginning. Moreover, there was still a mismatch between the incentives faced by operators and the objectives of the authority. This discrepancy became evident in mid-2011, being seen in a clear lack of sensitivity by operators to passengers evading fares, and the skipping of some bus stops in order to reach the performance indicators associated with the operational plan (Muñoz, Batarce and Hidalgo, 2014).

Approaches to changing the system

At the beginning of 2012, the fraction of operators' revenues that actually represented the number of passengers transported was between 20% and 30% of total remuneration. The remaining percentage was a fixed income that depended on the kilometres travelled and the availability of the fleet, as well as on a mechanism for "smoothing" variations in demand (Puga, 2017). In fact, in 2012 the main service quality index was ICPKH, which continued to weigh the entire income depending on the availability of the fleet in time and form on the route.

According to Puga (2017), under this scenario, the changes implemented in 2012 were aimed at achieving a greater correlation between the number of passengers transported and the income received by the

operator, along with a simplification of the incentive scheme. This change substantially simplified the incentive structure facing the operators. There was now a price per passenger transported (PPT), which differed for each business unit, and a price per kilometre travelled (PK), which is standard throughout the system. These prices are used to multiply transactions, i.e. validations and kilometres travelled, respectively, to determine revenue before discounts. The change gave greater weight to the PPT, while the PK sought to cover marginal cost and thus maintain the incentive to provide service even on low-demand routes, called social services. Thus, the calculation of remuneration was made by giving greater weight to the payment per passenger transported, with 70% of the income being determined by the number of passengers transported and 30% by the number of vehicle kilometres travelled (Puga, 2017).

In addition, under the rules adopted in Transantiago's original bidding process, the state did not have the ability to cancel contracts if operators did not meet the service quality indicators. Another important change made in 2012 was, therefore, to provide the government with the option of cancelling contracts in extreme cases, albeit that this remained difficult in practical terms, given the size of the business units.

At the same time, the Attention Quality Index (ICA), the Vehicle Quality Index (ICV) the Operational Fleet Indicator (IFO) and the Analysis of Effective Transport Availability Index (ADET) were established to enhance service provision by operators (Puga, 2017). In addition, revision mechanisms were added, in order to adjust prices depending on the circumstances. Furthermore, business units were reduced, thus establishing a new operating scenario for public transport concessionaires, in which each company had its own colour, all of this within the framework of reducing the economic deficit of the system as a whole to establish an efficient state subsidy system in the medium term¹¹ (De Gregorio et al., 2017). Additionally, the trunk and feeder structure was partially modified, introducing longer routes in order to reduce transfers. This led to a system with seven business units, as seen in Table 3.

Table 3. Concessionaires following the 2012 contract changes.

Zone	Operator	Nº of services	Nº of vehicles	Bidding Period
Unit 1	Inversiones Alsacia S.A.	Services transferred to other operators.		2012 – 2018
Unit 2	Subus Chile S.A.	57	1319	2012 – 2020
Unit 3	Buses Vule S.A.	98	1463	2012 – 2021
Unit 4	Express de Santiago Uno S.A.	67	1678	2012 – 2019
Unit 5	Metbus S.A.	59	1155	2012 – 2020
Unit 6	Redbus Urbano S.A.	65	790	2012 - 2019
Unit 7	STP Santiago S.A.	37	628	2012 - 2019

Source: Directorio de Transporte Público Metropolitano (2015).

However, despite the changes introduced in 2012, in many cases the quality of service remained deficient. According to De Gregorio et al. (2017) this was because tools for monitoring service quality, such as passenger counting, were never implemented as stipulated in Transantiago's original design. The state did not as yet have the technology to verify and supervise the quality *in situ* of the service provided by the operators and situations such as overcrowding or long waiting times were invisible to the monitoring system. In fact, the main problems of the system currently are the same as those which the 2012 changes sought to address, i.e. the capture of passengers and fare payment through the priority of payment per passenger transported to operators (De Gregorio et al., 2017).

Yearnings for a new system

Transantiago was at a crucial moment in 2017, with an opportunity for improvement being provided by the expiry of the existing contracts with the operators. The contracts of Alsacia and Express were due to expire in October 2018, while those of STP and Redbus had already expired in 2016, although they had been extended through a special provision under the operating conditions, allowing these contracts to be extended by 18 months.

Efforts to prepare the call for bids began (quite late) in September 2016, with the aim of publishing it during the last trimester of 2017 and awarding the contracts just before the government transition in March 2018. Only four business units were put to tender (the ones run at the time by Alsacia, Express, STP and Redbus) as the other operators had contracts with over a year left until expiry so it was decided that they would be tendered during the next term of government. Therefore, this request for tender included approximately 50% of the bus fleet operating in the transport system in 2016. It was decided that the network of routes would not be radically restructured with the intention being to avoid users having to learn to travel again, despite the fact that it was clearly necessary to re-structure several routes, especially with the imminent opening of two new Metro lines (Lines 3 and 6).

Critical issues of the system

Under the guidelines presented above, the authorities set out to analyse the critical points of the system of the time, which are presented below.

Size of the companies

There was evidence that companies such as Alsacia and Express, which operated nearly a thousand buses each, were losing management capacity, necessitating government intervention. It was concluded that the current transport companies operating Transantiago services were excessively large, affecting the efficiency of the system¹². Therefore, one of the key issues to be addressed in the new tender was the reduction in size of the concessions to be offered. According to De Gregorio et al. (2017), this reduction would reduce the risk of capture, understood as the influence concession-holders are able to exercise over the decisions of the government authority as a result of their size or economic influence.. It was also expected to result in more flexible companies that can adapt more easily to the changes needed to improve the urban transport system of Santiago. In this context, the call for tenders launched in 2017 proposed that companies should not account for more than 10% of the fleet (which, given the size of Transantiago implied a maximum fleet size of a little over 600 buses).

Frequency and regularity

The indicators established in previous tenders did not result in users having a service that corresponded to their expectations in terms of frequency and regularity. Faced with this, the government decided not to reduce the fleet, even though the new Metro lines 3 and 6 compete with some bus services. Instead, it was decided to retain the existing fleet size, providing an opportunity to increase frequencies and reliability. It was also recognised that this problem could not be solved just by defining incentives for operators. Rather, infrastructure projects which would improve the efficiency of public transport would

be required, along with the application of technology. Based on this analysis, it was proposed to coordinate the bids for operators with those for technology solutions. However, this was not included in the call for tender due to the very tight deadlines caused by the delay in launching the process.

Ownership of terminals

Terminals are recognised as a barrier to the entry of new bidders; hence their operation and ownership must be treated separately. As De Gregorio et al. (2017) points out, owning a terminal implies a significant competitive advantage in future tendering processes, considering that their strategic location often makes them a scarce resource, constituting a threat to the sustainability of the system. Thus it was decided that the state would buy the terminals from the operators and so real estate appraisal studies were commissioned with this purpose.

Quality of the system and limited resources

Although the need to deliver better service quality was recognised, fare revenue was to remain largely constant, along with the level of state subsidies.

Contents of the bidding process

Based on the critical areas observed and listed above, the terms of reference for operator bidding began to be developed. The following summarises their content.

Improvement of incentives and indicators

Recognising that the change in the payment formula in 2012, which established a greater weight of payment per passenger transported, had not resolved the issue of evasion, a payment formula was sought to encourage the provision of a quality service, to ensure a reasonable projection of the flow of operators and also to allow the state to be more flexible when changing routes. In fact, it was acknowledged that the charge per passenger transported was very inflexible in this sense, since an operator would accept a change of route only if he was assured that the demand for his services would remain within the current range. Considering the international experience, it was agreed that the payment should be mostly per kilometre travelled by services carrying passengers. Although there was a proposal to completely eliminate the payment per passenger transported, it was finally decided to maintain a percentage of this in the payment formula, mainly due to the issue of evasion. Thus, by eliminating scheduled and extraordinary revisions, with this percentage of payment per passenger transported there would be a sufficient incentive for operators to address fare evasion. Additionally, this tender was quite special as it included a limit on the payment per kilometre travelled and per passenger transported, which was defined by the Ministry of Transport. This ensured that they remained within the current spending levels of the system. Given this context, the conclusion was that the payment formula should be 75% per kilometre travelled and 25% per passenger transported, a result quite similar to the original proposal, with the difference that now there was the technology to monitor the operation of buses.

Moreover, the incentives for operators to provide a quality service to users, complying with the required frequency and regularity, were reviewed. Thus, an incentive of up to 10% of additional revenues was defined if the concessionaire operated above the established regularity threshold. On the other hand, recidivism discounts of up to 7.5% of the concessionaire's revenues were established if they did not conform to the indicators. In addition, all the indicators in the system were reviewed. Finally, they opted

to maintain the vehicle quality index (ICV), improved to better reflect the users' evaluation of maintenance, the attention quality index (ICA), improved to better understand users' opinions regarding drivers and how they drive, and the regularity control index (ICR), which was modified to become much more similar to the indicator of excess waiting time, based on the coefficients of variation of waiting times. The frequency indicator was eliminated, due to the hypothesis of companies carrying out undue and unnecessary practices only to comply with it.

Review of the network and the business units

Considering that the operating companies were very large, efforts were undertaken to find an optimal size for the business units that would allow them to be attractive to international and national bidders, but at the same time have a manageable size and control capacity. After a case study (looking for best practices in systems elsewhere) and literature review, it was concluded that the optimum was around 450 buses per business unit. Thus, since the total fleet being tendered was of nearly 3 200 buses (i.e. the old business units one, four, six and seven), it would now be divided into nine new different business units.

To achieve this, the network was analysed and the services that required enhancements were identified. Adjustments in the service network and operation programmes implied 150 additional buses and 19 new routes. Once the routes were defined, they were grouped into new business units following geographical criteria (e.g. ensuring terminals were available for each unit) in an attempt to make them attractive from the point of view of prospective operators.

Requirements and fleet quality

Within the context of Santiago's pollution mitigation plan, which was being worked on in parallel to this tender, it was established that the new buses entering into operation under this new tender had to be certified to at least the EURO VI emissions standard.

Moreover, as an electric bus pilot programme was also being developed in parallel, it was decided to generate incentives to include electric buses in the fleet. To meet this objective, it was defined that, for each operator, at least one service had to operate with electric buses. Considering that the average fleet of each service comprised around 15 buses, each operator was then required to offer a minimum fleet of 15 electric buses. A clause was also established requiring that all bids must include, apart from the 15 electric buses, at least 15 high standard buses, which could be electric, air-conditioned or with a full low floor.

The elimination of articulated buses was explored, but according to Ministry of Transport estimates at the time, it was not feasible from the point of view of keeping operation costs low. However, it was stipulated that articulated buses would only run on avenues that have the minimum infrastructure allowing for proper operation. Thus, the bidding terms explicitly included all services in which concessionaires could offer articulated buses. This logic also applied to small buses and incorporated the possibility of including double-decker buses, the so-called type F, which in theory could replace an articulated bus in terms of capacity. The requirement for a door on the left side for some services (more expensive but originally included due to several planned bus corridor projects) was removed, except for those routes for which they were required due to corridors with left-side (BRT standard) stations that were about to be built¹³. A redesign of the interior of the buses, with the number of seats redefined as well as the inclusion of folding seats, was among other requirements that were reviewed with a team of designers.

Terminals

Since it had been determined that terminals should be owned by the state, but there were no resources to purchase them all, only two were expropriated. For the rest, long-term lease contracts began to be negotiated with the current owners¹⁴, who were either operators or sometimes third parties from whom the current operator leased and who were keen to follow this new system. The possibility of the terminals accommodating multiple operators was also discussed but discarded due to operational difficulties in terms of union management.

Explored but not implemented modifications

The previously discussed aspects were the key features of the new call for bids. However, certain relevant aspects were explored but finally not included in the call, probably due to time constraints. .

Bus ownership

The concept of the provision contract, which has existed since 2016, implies that the operator would be required to lease their fleet from a bus provider. Therefore, if the operator leaves the system, the bus would continue to run, having been transferred to the replacement operator, who must assume the payment of the remaining leasing fees. This mechanism is expected to reduce costs and would probably also improve maintenance levels. However, the idea of requiring operators to enter into such contracts for their buses (instead of directly owning them) was ultimately not included in the call for tenders.

Technological and financial services

With respect to AFT and other information systems, only general guidelines were defined. For example, there was a consensus that the new payment system should be, in the short term, based on accounts and not on the card, as is currently the case. Therefore, through online validators connected to 3G, physical validation through “totems” could be eliminated and credit or debit cards could be used to pay. However, all these were just ideas and only a basic bidding draft was drawn up, given the limited time available.

Criticism and crisis

One of the critical issues of this bidding process was the limited time bidders had to prepare their offers, which was only four months including the “question and answer” period. Despite this, all business units received bids from at least two companies, except one where only one company tendered. At the same time, for each unit receiving more than one offer, at least one of the offers was from a company new to the system.

However, in early 2018, Transanber and Transantin, two companies seeking to participate in the process, filed a lawsuit against the Ministry of Transport for Transantiago's bidding process, arguing that it would be difficult for interested companies to participate fairly in this process. The Tribunal for the Defense of Free Competition (TDLC) decided to accept this lawsuit, citing three main causes:

Cause 1: Small bidders were disadvantaged compared to larger bidders:

This issue emerged at the technical evaluation stage of the bids. A points scale was established to assess bidders' experience in public transport, a formula proposed by the Comptroller General of the Republic. Criticism centred on the disadvantages faced by those located at the edges of this scale, since they were harmed by the fact that it was not a continuous scale. This cause was later dismissed.

Cause 2: Disqualification of Alsacia

It was established that, if an operator had a regularity control index (ICR) score lower than the minimum required by the system in the previous evaluations, it could not participate in the new tender. This excluded Alsacia¹⁵, one of the major operators of the system and the one with the poorest service and quality indicator scores. This point was rejected because it is the responsibility of the Ministry of Transport to lay down conditions based on the regularity of operators, whereas the law also requires the experience of those who had already participated in the system to be taken into account.

Cause 3: Suspicions of collusion between the current operators

The bidding rules stated that bidder could be awarded more than 40% of the system, or more than two business units. However, this restriction applied to new bidders seeking to enter the system, but not to current operators who already had a previously established role in 2012. Furthermore, among the bids submitted, there was never competition between two current operators, while the companies Vule, STP and Metbus shared certain percentages of cross ownership. This cause was upheld by the TDLC and resulted in the cancellation of the tender.

Cancellation of the bidding process

Faced with the complaint filed by Transanber and Transantin to the Tribunal for Free Competition, the government, which had already opened the technical offers, decided not to open the economic offers. For some this was a strategic error since, once opened, the economic offers showed there was no collusion as the prices were competitive.

The process remained frozen until after 11 March 2018, the date of change of government. Finally, the TDLC accepted an appeal presented by the Ministry of Transport of the former government, thus lifting the precautionary measure that kept the bidding process suspended until further notice. The first two cited causes were thus dismissed. It was also determined that the third factor applied only to business unit nine, so the bidding process could continue for the remaining units.

However, with the arrival of a new government and therefore with new objectives in mind, the bidding process conducted by the former government was declared void. According to the Minister of Transport, Gloria Hutt, "it was a process that was carried out in an improvised way, without taking into account the interest of the users, with the wrong incentives that could lead us even to the situation that we all remember of bad service in 2007" (Emol, 2018).

There were two main arguments used to dismiss the tender led by the former government. On the one hand, the legal aspect, given that after the TDLC referendum, it would not be possible to continue with the

bidding of all business units. On the other hand, the contractual basis, or aspects of the bidding terms that seemed wrong to the technical team of the new ministry. The payment formula to companies of 75% for the kilometres travelled and 25% for the passengers transported was seen as constituting an incentive for buses to circulate without carrying passengers. Another justification to dismiss the tender was the claim that a tender for complementary services and payment mechanisms could not take place after the tender for services.

Although it is true that the tender-preparation process started too late, triggering several shortcomings and problems, the decision to dismiss the tender has not been free of criticism. Many consider this cancellation to be a mistake, prompted mostly for political reasons. According to Andrés Gómez-Lobo, former Minister of Transport, "it was not an improvised process, but a three year job, with seven months of public consultation. The terms were set for public consultation and approved by the Comptroller's Office. Despite the legal pitfalls with the TDLC, the precautionary measure was lifted and offers could be issued" (La Tercera, 2018).

Towards a new tender?

The new government stated that it would create a new tender aimed at changing certain structural elements of current contracts, putting more emphasis on the idea that ownership of terminals and buses should not be in the hands of the operators. It has also stated its view that contracts should be shorter (five years), for smaller business units, and renewable only if the operator performs well. The call for bids was initially expected to be made in July or August 2019, but did not ultimately occur until December 2020.

Despite the delay in the process, there have been visible changes in the system. With the recent end of Alsacia's operations, significant savings were achieved for the government due to the fact that Alsacia had the highest "price per passenger transported" (PPT) in the system. By transferring Alsacia's former services to operators with lower PPTs, budget savings have allowed the financing of new buses. To date, this has resulted in the purchase of 200 electric and 490 Euro VI compliant buses. This is where the concept of provision contracts (see above) was first implemented (at least at a large scale). This mechanism allows operators to choose their supplier, while the bus is paid in quotas and transferred to the next concessionaire, who continues to pay the debt. In the current conditions this means, however, that the debt has been, in practice, taken over by the state.

While a significant part of the fleet has been renewed, separating the purchase debt from the contract time left to the operator, the completion of the new tender process remains pending and therefore operating conditions cannot be significantly improved. The introduction of the new buses came with the announcement of a "new public transport system" named Red¹⁶ (Red Metropolitana de Movilidad, 2019). This system seems to operate in parallel to Transantiago although, for all practical purposes, it is the same. It is even possible to see Transantiago and Red buses running the same service. This move, apparently purely driven by marketing, has received criticism since it is regarded as a somewhat "cosmetic" change, with buses that have Wi-Fi and USB charging ports, but with no improvements in service frequency and or congestion due to the lack of dedicated infrastructure. The government has announced improvements in the operation of the system and has tried to convince the public it was thanks to the change in colour of the buses (calling it the "Red standard"), while in reality it was the result of Alsacia being removed from the system and its services being operated by more efficient companies.

Conclusions

The history of concessions for Santiago's public transport system is short when compared with that of other cities in the world. It is, however, quite relevant because of Transantiago; a bold plan designed to improve the transit system of a large city like Santiago, with an overnight change in operations, that seems to be unique in the history of formal public transport. The development of a blueprint for improving the provision of transport services throughout the city was an ambitious effort, proving to be overly complex. From the analysis of the bidding processes carried out over the last few years, it can be concluded that, although the system was in general well conceptualised, it suffered from several design, implementation and operational issues. Although these have been gradually resolved, improving the level of service, it has been unable to shake off the bad image (rightfully) acquired at the beginning of its operations.

In the process of design and implementation of Transantiago, the government initially decided to opt for a system based on private participation, through a system of concessions, leading to the establishment of an efficient system in terms of its costs, with the capacity to self-finance and thus dispense with external financing sources other than revenue from the fare payment. In this way, there was a strong focus on minimising costs while not necessarily improving service for passengers. A large-scale "overnight" implementation with significant changes in routes and supply, added to a lack of incentives for the companies to operate as promised, led to a chaotic implementation. Nevertheless, positive effects were achieved, such as improving road safety and making the Metro more accessible to many more users. This is largely thanks to the implementation of an integrated fare, which has also provided significant resources enabling financing of the extension of the Metro system.

In the following years, the compromised quality of the service led to a series of reviews of the contracts and therefore the incentives under which the concessionary companies operate. To this end, a series of relevant indicators and discounts have been incorporated, seeking to improve the service quality without necessarily implying an increase in costs and, in this way, providing solutions to the main problems of the system. However, this has emerged as the main difficulty that governments have had: designing good performance measures and an incentive model that allows them to deliver a service oriented to meet desired levels of accessibility, inclusiveness, pollution and congestion. This indicates that leaving the operation (and some managerial aspects such as the technology for fleet control) in the hands of private firms implies a great risk that should be prevented in the contracts by incorporating adequate incentives and mechanisms that render credible threats to companies not fulfilling their acquired compromises.

In this regard, the 2012 contract modifications implied a radical change in the incentives to operators, seeking to promote the capture of passengers by changing the payment calculation formula, giving a greater weight to payment per passenger transported. These changes, however, seemed to be constrained by technological shortcomings at the time and couldn't mitigate the "too big to fail" problem. The call for bids attempt of 2017 was apparently aimed at improving this and advancing in the right direction, although the late beginning of the process made it impossible to include some key aspects in the call. The fact that this tender failed due to a mix of political (tight deadlines) and technical issues is also an indicator of how such a complex and important process was not given the priority it deserved. Although this bid was declared void, it is evident that changes are currently being observed in the transport system, with a significant number of new buses circulating in the city, along with the apparent renaming of the Transantiago system to "Red ". However, the efficiency and quality of the system goes beyond a mere change of name (and certainly nicer buses) and more modifications are necessary in order to provide a better service. Considering that frequency and travel time are systematically reported by users as some of

the worst aspects of the system, it makes sense to direct new efforts into generating well-controlled bus lanes and segregated corridors. This, however, has proved to be difficult to achieve and seems to be at risk. Current authorities have stated, for example, that "in six years 70% of trips will be made by Metro" and that "buses will be constrained to play only a feeder (towards the Metro) or complementary role in the system" (La Hora, 2019). Moreover, the recent suppression of two key projects that would implement BRT-standard segregated corridors (the bus corridor above the AVO urban highway and the renovation of the Alameda-Providencia axis) seems to confirm these fears. The fact that the official twitter account of the Transport Ministry posted a very long thread¹⁷ attempting to justify not investing in bus corridors is also a very confusing and disturbing signal for the public transport system of Santiago.

Besides all the previously mentioned issues, the fact that the tender process has been delayed by more than two years is a fact that raises many concerns. The uncertainty in this regard is clearly introducing an additional complexity to an already difficult process. The chapter of the renovation or transformation of Transantiago into a new system, finally achieving its original promises, is still to be written.

Notes

1 Santiago's population is expected to exceed 7.5 million by 2020, which would account for over 40% of the country's total population. In this context, Chile's population growth rates indicate that Santiago's population will stabilise at around eight million, below mega cities such as Sao Paulo or Mexico, which already exceed 15 million inhabitants (IRM, 2017).

2 The growth of the city of Santiago has manifested itself mainly as a densification of its central areas. However, a significant part of this growth has been due to expansion, with low-density real estate developments that have extended urban limits and have caused the increase of the "urban footprint" of Santiago by 26% in just ten years (De Mattos, Fuentes and Link, 2014).

3 Recently, Santiago's public transport system was renamed as "Red Metropolitana de Movilidad" (Metropolitan Mobility Network) or simply "Red" (Network), an image change that is related to the new quality standard that the service seeks to implement (Red Metropolitana de Movilidad, 2019).

4 Small buses, with 20 to 24 seats.

5 On average during this period, in Santiago, one person died every three days in an accident involving public transport buses (Velasco, Gómez-Lobo and Díaz, 2004).

6 <http://www.sectra.gob.cl/biblioteca/detalle1.asp?mfn=837>.

7 <http://www.sectra.gob.cl/metodologias/dirtip.htm>.

8 As part of the preparation of this tender, the consulting firm was commissioned to develop a strategic model of the new system, which provides only a coarse solution whose sole objective is to be able to answer general enquiries. Thus, the software creates the network and decides on its frequencies, all automatically. From both data and the speed projections that are calculated from the characteristics of the road network, a number of buses necessary to comply with this scheme is derived. This allowed for the estimation of strategic indicators, such as average waiting times, average Metro loads, average travel times, average number of transfers and total operating costs, among others. However, the bidding bases did not specify the number of buses that each operator had to have, but rather required service frequencies (Quijada et al., 2007).

9 It arises from the establishment of a fixed fare, which could not be higher than that of the previous system and it was thought that given Transantiago's efficiency gains, it would allow financing the new plan, without the need to increase the fare (Briones, 2009). However, this assumption turned out to be false and given the dynamics of the original contracts, which will be described below, its consequences were enhanced.

10 The implementation of these devices was the responsibility of the AFT consortium and the firm in charge of the technological aspects Sonda. According to Díaz et al. (2006), this technological base should be relatively easy to achieve. However, the facts demonstrated the opposite since the effective installation of these GPS systems was not coordinated. Their absence prevented the authority from knowing correctly how many buses were in the street or if they were making the so-planned routes. Indeed, at first, people were hired to count the buses leaving the bus terminals and passing through stops.

11 According to Puga (2017), between 2009 and 2015 four laws were enacted to increase the annual amount of the subsidy for Santiago's transport system, which is equivalent to about 63% of the annual budget of the Ministry of Transport (Dirección de Presupuestos Nacional, 2016). This is framed within the scope of subsidising public transport as an efficient policy, justified to maintain bus frequencies and reduce waiting times for passengers, while reducing car use, thus generating positive externalities. It should be noted that the progressive deficit observed in the Transantiago system, which is sought to be compensated through this subsidy, suggests the need for a revision of the fare adjustment mechanism and the stabilising subsidy, according to Gwilliam, Hidalgo and Velásquez (2015), related to the true cost of key variables, such as the cost of fuels, exchange rate, fleet size, and Metro investments, since the annual revision of the subsidy value is currently carried out based on the consumer price index.

12 In fact, there was already a discussion about the "too big to fail" phenomenon, since the state had to allocate a fraction of the increases in the subsidy to some concessionary companies in order to avoid their bankruptcy, especially to those that were inefficient, but too large and, therefore owning a very significant share of the buses in the system.

13 At least two of these BRT-standard corridor projects were cancelled by the current administration.

14 After two years, the new government decided to lease for nine years the terminals of Alsacia, once the largest operator of Transantiago, for more than USD 100 million, that is, 2.6 times more than the amount defined by the real estate study made by the previous government (BioBioChile, 2019a).

15 At this point, the Ríos-Velilla brothers, owners of Alsacia and Express had already sued the Chilean Government at the International Centre for Settlement of Investment Disputes of the World Bank, claiming that the government did not fulfil an agreement of a free trade treaty with Colombia among other obligations (BioBioChile, 2019b).

16 All the new buses are red. There is a play on words as in Spanish the word "red" means network, but general knowledge of English in the population is enough to also associate it to the colour of the buses.

17 <https://twitter.com/MTTChile/status/1138578020338491397>.

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