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Regulatory frameworks in public transport including tendering

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REGULATORY FRAMEWORKS IN PUBLIC TRANSPORT INCLUDING TENDERING

David A. Hensher

Introduction

This chapter focuses on economic regulation, which has an overarching role to ensure that prices and quantity, including quality, of services are aligned with objectives such as the public interest in the provision of public transport. Such regulation is exercised on both natural monopolies and market structures with imperfect or excessive competition. Matters of safety and environmental regulation, often referred to as social regulation (see Viscusi et al., 2005), while also important, are lightly covered given the focus on economic regulation. The range of theories that guide regulatory reform are synthesised before looking closely at specific approaches to procuring services in bus contract design.

The chapter complements Hensher (2018), which explores the role of contracting in the delivery of efficient and effective services as a way of revealing the potential strengths and weaknesses of alternative ways to garner greater performance from the delivery of bus services that are primarily under the control of the public sector but which are increasingly delivered by the private sector on behalf of the public sector.

Economic theories of regulation

There is an extensive literature on the regulatory framework within which goods and services are provided in every country. Economists have developed sophisticated interpretations of how regulation can be used to guide, or control, the way in which services are provided. The role that various agents play in the public and private sector is controversial, and there is no absolute agreement on these roles, despite there being a large volume of theory and practice documented in support of one or more ways in which services might or should be provided. Within the public transport sector, the ambiguity and disagreement remain despite efforts over the last 30 years at least to both promote and reform the way in which public transport is provided. The full spectrum has ranged from public monopoly (nationalisation) to economic deregulation, with competition for the market through tendering being used as a compromised way of controlling the market (in lieu of negotiated contracting) while aspiring to a cost-efficient (and desirably network-effective) outcome that befits a competitive setting. Before taking a closer look at the structural change in the provision on public transport, drawing on examples in bus supply in
various geographical jurisdictions, some of the theoretical contributions are synthesised as a
guide to what might be best described as aspirational or ideological views of the world of service
delivery, which is often drawn on to promote a particular position with respect to the role of
economic regulation.

Kay and Vickers (1990) make a useful distinction between ‘structural’ and ‘conduct’ eco-
nomic regulation. Structural economic regulation concerns the regulation of the market struc-
ture and includes restrictions on entry or exit (the interpretation associated with competitive
tendering); in contrast, conduct economic regulation is used to regulate the behaviour of sup-
pliers and consumers in the market and includes price controls and minimum quality stand-
ards, monitored as appropriate through actionable benchmarking. A distinction is often made
between public and private interest theories (Den Hertog, 2012). Public interest theories of reg-
ulation assume that sufficient information and appropriate enforcement powers exist to ensure
that the public interest is enhanced by an essentially benevolent regulator. In contrast, private
interest theories promote a position that regulators are not well informed on demand, cost and
service quality and tend to be less benevolent, resulting in private self-interest at the cost of the
public interest. Intervention by a public sector authority is typically aligned with market failure
and the need to support a social welfare outcome through efficient, albeit appropriate, govern-
ment intervention.

Where there is often a lack of appropriate public sector knowledge of an industry sector,
there is a case for a contribution from the industry sector itself provided that this complements
the role of government and does not singularly promote a private-sector commercial interest
that is not aligned with achieving government objectives. The challenge herein is with how it
can be ensured that this alignment provides a mechanism to ensure that the less informed public
sector becomes more informed through private-sector participation to deliver a social welfare
outcome when public funds are at risk (Den Hertog, 2012). Delegation of powers within each
sector, but most notably in the government sector, is often a cause of regulatory failure, where
‘expertise’ is in the hands of those with limited and often inaccurate information on the indus-
try sector they are responsible for through implementation of the regulatory framework. The
formation in the United Kingdom of specialised regulatory agencies (e.g., Office of Rail) is
one way of ensuring the relevant specialised skills, and the focus in Singapore through the Land
Transport Authority of expert knowledge of specific sectors is laudable, building significant
trust and respect between the principal and the agent.

Public interest theories are most often applied to explain regulation in terms of achieving
economic (cost) efficiency (Joskow & Noll, 1981, p. 36); however, such theories are also often
interpreted more broadly to correct inefficient or inequitable market practices (Posner, 1974;
Den Hertog, 2012), designed to achieve a broad socially efficient (including equity or distribu-
tional implications) use of scarce resources as opposed to an economically efficient allocation
of resources.

Although market failure has historically been used to justify government intervention, there
has been significant criticism of this position, linked to the failure to recognise transaction costs
and the role they play. Transaction and information costs which underlie market failure are
assumed to be absent in the case of government regulation (Williamson, 2002). Market failure
is a result of a divergence between the price or value of an additional unit of a particular good
or service and its marginal resource cost. The theory of second best has demonstrated that the
partial aim of efficient allocation does not make the economy as a whole more efficient if una-
voidable inefficiencies persist elsewhere in the economy, as is typical in transport with under-
priced alternatives (such as the private car) to public transport where there are observed external
effects, taxation, imperfect competition and inadequate information. An appealing regulatory
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theory must explain how and why regulation is comparatively the best transaction cost-minimising institution in the efficient allocation of resources for particular goods, services or societal values (Zerbe, 2001). Competition may replace some elements of regulation but not all.

In general, the market mechanism itself is often able to produce institutions to compensate for any inefficiencies, with private enterprise developing appropriate ways to avoid adverse selection and quality concerns through best practice performance. The assumption of market failure when a dominant firm supplies the market has been criticised by many authors, notably Demsetz (1968), with significant returns a result of superior efficiency as well as the possibility of competition for the market (Baumol et al., 1982) as opposed to competition in the market.

A key concern of the public interest theory is that the normative theory of economic welfare is being used as a positive explanatory theory of economic regulation (Joskow & Noll, 1981; Den Hertog, 2012). Empirical testing of public interest theories relative to private interest theories has concentrated on the effectiveness and not the efficiency of regulations with limited consideration on such matters as are prices lower, is price discrimination absent, is there a reduction in costs, did congestion decline and is the political influence of interest groups identifiable?

An alternative perspective was presented by Stigler (1971) that became known as the Chicago theory of government. Stigler argued that economic regulation is designed to benefit specific industry groups, for example, the suppression of transport by the trucking sector to protect the railways, whereas Posner (1971) argued that it benefited consumer groups, for example subsidised prices for all public transport users, even though the cost of such services varies by location (e.g., regional vs. urban, inner and outer urban). Regulatory practices appear to confirm this prediction, where regulated industries are either monopolistic, such as rail transport in most countries, or highly competitive, such as freight and ride-sharing services such as Uber, Ola and taxis (see also Chapter 19). Importantly, in the context of public transport, the theory of economic regulation also predicts that the benefits will take the form of transfers directly through subsidies (typically provider side) or indirectly through price or quantity regulation or restriction to market entry. In Stigler's view, competitive industries have much to gain from economic regulation and are in a better position than consumers to bring favourable regulation about. In practice, such regulation of competitive sectors is rarely seen. One explanation is found in Becker (1983), whose theory suggested that the loss of economic welfare is greater where the elasticity of service supply is greater and that in competitive sectors, the elasticity of such supply is large (Den Hertog, 2012); hence, the transfers of personal or business income and the welfare losses associated with regulation are so large that the countervailing pressure invoked eliminates any investment in political influence. In more general terms, the criticism of the Chicago model's view of the power of organised groups has led to a recognition that there are many more influences at work, as promoted through the Virginian School of Public Choice (Tullock et al., 2002), which has a strong distributional focus.

In the public transport sector, the winds of change moved in many countries from the late 1980s onwards, linked in particular to the desire to promote cost efficiency and innovation, to decrease the extent of political intervention, to reduce government borrowing (essentially to move debt off the government books, as in the United Kingdom in the Thatcher era), to increase political popularity, to undermine trade-union power (the Thatcher interest), to lower the level of cross-subsidies and to eliminate the inefficiencies caused by uninformed or rent-extracting regulators. These developments align to varying degrees with almost all theories of economic regulation and as such might be best described as a hybrid interpretation of the guidance from theory.

The following sections trace some of the key reforms in the bus sector, noting that both competition in the market (i.e., economic deregulation) and competition for the market
(i.e., competitive tendering) or negotiated contracts have been used as ways to achieve a number of the promoted benefits of reforms under economic regulation (Hensher & Stanley, 2008), where the regulator has varying degrees of knowledge and sophistication with respect to protecting the economic interests of the sector they have societal responsibility for.

Reform in the bus sector

What has been learnt over the last 30 years? Although there has been a limited amount of economic deregulation, the dominating approach to reform in the bus industry (excluding the deregulated long-distance coach sector) has been through competition for the market, in large measure due to the claimed natural monopoly nature of services, be they urban or non-urban (see also Chapter 13). While there is clear competition with other modes (notably the car for school travel and the car more generally), the economics of bus services (including patronage levels) has in the main mitigated against competing operators, be it in a route or area-wide geographical setting. The procurement model has been either competitive tendering or negotiation, with the majority of contracts taking on a gross cost form (typically a total cost per service kilometre), although in earlier years, there was a great deal of interest in net cost contracts (Van de Velde & Alexandersson, 2020). The change in focus might best be traced to the reduced attractiveness of a contract where the risks are ambiguous and where growth prospects for patronage were shown so often to be illusory. Regulators have tended, under the influence of lawyers, to over prescribe the details of a contract, resulting in major concerns \textit{ex ante} about exactly what is required in areas such as service quality and service variations.

Although the theory of incomplete contracts suggests that a simplified \textit{ex ante} contract would ensure greater clarity (Hensher, 2010), it requires acceptance of the willingness on behalf of the regulator and operator to sit down \textit{ex post} and clarify any points of ambiguity as part of a shared responsibility in delivering an efficient and effective service. This is at the heart of a trusting partnership (Stanley & Hensher, 2008; Hreljaa et al., 2018). For example, the recent five-year bus contracts in Singapore in two tranches (won by Tower Transit and Go Ahead, respectively, in rounds 1 and 2) were gross cost management contracts, with all assets being owned by the public sector (through the Land Transport Authority as the regulator), with explicit wording during the bid phase that the winner will sit down with the regulator and clarify any matters, including possible variations, prior to signing the contract but after the bid submission and award announcement of the successful bidder. In Singapore, the successful bidder was not the least cost bidder but one deemed able to commit to delivering significant improvements in service quality.

Throughout this period of significant reform in many countries, notably in Western Europe, Australasia, South Africa and some Latin American and Asian countries that have a desire to move away from public monopoly provision of public transport, there has been a great deal of real-world testing of various regulatory reforms, discussed and summarised in many papers from the Thredbo conference series. There have been different procurement models, contract designs and obligations associated with the operator and the regulator. Often, many of the challenges have been associated with the strategic ‘societal’ role of public transport in contrast to how to improve the (cost) efficiency and (network) effectiveness of services when faced with markets that vary from very sparse to very dense and the associated debate on whether the focus of service delivery should be on spatial coverage and/or (corridor) frequency (Walker, 2011). Importantly, no matter what regulatory model is used to offer up services in the market, the market will remain a very powerful arbiter of its success since it is the setting within which patronage
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arises. The mapping of operators (suppliers) with the preferences of regulators (on behalf of government) who increasingly are taking on the role of transport planners and service designers, in an essentially subsidised non-commercial setting, has become a high-agenda theme in public transport. Arguments have been made in favour of one regulatory framework over another.

Before focusing on two important themes, namely incentives in contracts and actionable benchmarking to monitor efficiency and effectiveness, additional comment needs to be provided on gross vs net contracts, tendered vs negotiated contracts and who owns the assets (management contracts in particular). Gross cost contracts are typically defined by a cost per kilometre that is paid to an operator to provide a specific service. The operator typically carries no risk with respect to patronage and service levels and is contracted to provide services and paid for such services (including a margin) regardless of demand. In contrast, a net cost contract typically involves a cost per kilometre under the condition that the fare box revenue is retained by the operator, or at least shared between the operator and the regulator. There is risk sharing here, since the revenue retained is not known and is dependent on both the market and the efforts of the operator.

Gross cost contracts dominate in most countries for many reasons (see Merkert & Preston, 2018), most noticeably the greater number of bidders in competitive tenders but also as a way of minimising risk from a regulatory viewpoint when revenue risk under a net cost contract can result in a decline in service quality when revenue targets are not met and, as is often the case, when the financial sanctions are inadequate, such as, for example, in Santiago (Batace & Ávila, 2019). Aarhaug et al. (2018) provide a comprehensive assessment of Norwegian local bus contracts since 1995. They find that despite cost increases, repeated rounds of tenders attract many more bids and result in noticeable reductions in unit prices. Furthermore, they conclude that the number of bidders is influenced by contract design, in particular the scale of the offer in terms of annual service kilometres, having a gross in contrast to net contract and providing facilities such as depots and parking areas. Importantly, they raise concerns about the future dominance of large multinational operators and warn about the potential loss of competition if this were to occur. Larger-scale contracts increase this risk, making it infeasible for smaller, efficient operators to compete, especially if the contract requires provision of all assets (in contrast to a management contract).

Competitive tendering became popular in the early 1990s as a way of breaking the stranglehold of the urban bus sector on inefficient public monopoly supply (see Hensher & Wallis, 2005). Windfall gains of around 30 percent were achieved in round one in many countries simply because the incumbents were never subjected to competition amongst bus service providers or performance targets and associated sanctions. Such windfall gains are never realised beyond the first round, and indeed subsequent rounds typically result in increases in costs (but not to the pre-tendered levels) and a risk of service quality decline (Wallis et al., 2010; Aarhaug et al., 2018), especially where overprescribed service levels are ambiguous through complex contracts. The appeal of negotiated contracts has arisen in part from evidence that incumbent operators are cost efficient and committed to long-term investment in the bus sector, which is always at risk with tendered contracts that have limited contract years, typically five years or less. In addition, there is a strong interest in building trust between the regulator and operators (which still maintain an arm’s-length commercial interest and avoid regulatory capture1) to encourage performance enhancement and investment beyond obligations under a tightly defined and time-limited contract (Stanley & Hensher, 2008). Any support for a negotiated contract must be accompanied by appropriate benchmarks to ensure that a value-for-money outcome is obtained which is effectively equivalent to a tendered outcome or better and where there is provision for tendering under non-compliance. The threat of tendering is a very strong antidote. In order
to make a case for negotiation, information on performance through benchmarking (to reveal counterfactual evidence) is essential (see Hensher, 2018 and a later section subsequently).

Although there is an argument that competitive tendering is transparent whereas negotiation is not and hence attracts greater political support, this is highly questionable. There is growing concern that tendering authorities do not reveal the assessment process in sufficient detail to have confidence in its transparency but also that details of the losers’ bids compared to the winners are never or rarely released. Under negotiation, actionable benchmarking can be used to release the agreed costings, at least to the auditor general or some other party where commercial information is not at risk. Since the funding is typically associated with taxpayer funds, there must be an obligation to ensure that the value-for-money test is transparently applied. Where there has been demonstrated cost efficiency under negotiation or even tendering, there should be a case made to retain the incumbent operator, provided agreed-upon standards are met going forward. Negotiation has an advantage of reduced transactions costs, which are known to be typically much higher through tendering. Hensher et al. (2016) develop a method to correct for differences in risk associated with the incumbents’ and new entrants’ bid price.

Within all of the contract settings discussed previously, there are two models of asset utilisation; one with the regulator owning all the assets (as in Singapore, Adelaide and Perth in Australia and many US jurisdictions) and the other where the operator acquires the assets (as in Sydney, Melbourne and Brisbane in Australia). In many settings, this difference can be attributed to the historical context, especially where an operator was initially a public monopoly in contrast to a business initially commenced by a private operator, where the latter almost always provided the assets (vehicles and depots). Asset ownership has interesting implications on risk and the number of bidders, as well as being used by some governments as a way of guaranteeing continuity of service if an operator defaults. By taking away the obligation of asset ownership, it has been suggested that this will result in more bidders and hence a better price achieved in the contracting of a service supplier. The debate on whether assets are owned by the principal or the agent continues to this day; however, some argue forcefully that ownership matters, with rights of ownership of an asset defined as the rights to use the asset, the right to appropriate returns from the asset and the right to change the form and/or substance of an asset (Wong & Hensher, 2018). This argument is aligned with theories around incentives, which are central to efficient contracts and property rights. One position relates to obligations on asset transfer under failed contracts. Specifically, assets are regarded in some settings as essential equipment (e.g., existing rolling stock), and hence there are obligations to pass these assets on to either a new operator who subsequently wins a tender or franchise or an operator brought in as part of a transition to ensure service continuity until a new operator is awarded the contract.

An interesting separation in recent years has been between the depot and the buses. In NSW, Australia, for example, the depot is separated out from the rest of the tendered service, which enables a successful bidder who is not the incumbent to initially access the incumbent loser’s depot (claimed by the latter as their private property), but where the access to use fails, government has established an agreement with a local council to provide another site for a depot. In addition, the terms of engagement mean the local council forbids using the incumbent’s site for other developments. New forms of asset ownership in the contracted public transport sector are also emerging. While a regulator owning assets and leasing them to operators can promote standardisation and greater attention to life cycle costs (Nash & Bray, 2014), there is a recognition, however, that the private sector could fulfil such a role more effectively and also better promote innovation. This forms the basis for a new middle ground where the regulator owned some depots/vehicles, whilst the operator owned others, hence promoting innovation at the margin (Nash & Bray, 2014).
There has been a great deal of focus on the need to build greater trust between the regulator and the operator. A trusting partnership is seen as particularly important because of the problems posed by incomplete contracts. A changing market environment makes the complete specification of contractual obligations extremely difficult. Furthermore, much experience (e.g., in many contracts in the Netherlands; see Bakker & van de Velde, 2009) suggests that a contractual focus on such detail discourages operator innovation and encourages an operational focus on cost cutting to increase profits. Where the government and operator(s) work in a trusting partnership, especially at the system design level, the best outcomes are expected to result (see Hrelja et al., 2018). This is at the heart of relational contracting. This expectation partly reflects the shortage of skilled people and the associated need to draw on all available skills to the maximum extent possible, wherever they are located. It also reflects the expectation that if the government and operator are jointly focused on achieving common goals (patronage and related outcomes), rather than on watching each other, the best patronage outcomes are likely to follow. This notion of a trusting partnership has evolved through the Thredbo conference series as being grounded in five Cs (Hensher & Stanley, 2010):

1. common core objectives tied to public policy purposes;
2. consistency of behaviour and direction;
3. confidence in a partner’s capacity to deliver;
4. respect for each other’s competencies; and
5. demonstrated commitment to good faith in making and keeping arrangements and in principled behaviour.

**Incentive contracts and why are they rare?**

The bus contracts discussed previously typically have very few, if any, incentive structures built into them. Drawing on Hensher et al. (2016) to provide a synthesis of the key issues. Hart and Holmstrom (1987) suggest that optimal contracts (incentive contracts) are often extremely complicated, and, indeed, they risk a regulatory nightmare in managing them. In the presence of moral hazard, optimality means inclusion of all relevant information and detailed specification of multiple contingencies. That contracts are usually simple in practice is a result of incomplete information, leading to what Bajari and Tadelis (2001) describe as a ‘nonconvex’ procurement problem resulting in extreme contracts. They argue that there is a fundamental difference between a fixed-price contract and an incentive contract, where a fixed-price contract requires no cost measurement. This leads to a clear discontinuity in the cost of measuring and monitoring costs and implies that fixed-price contracts will dominate contracts that are ‘close’ to fixed price, and as it becomes costlier to measure costs, fixed-price contracts will dominate a larger set of incentive contracts. Similarly, they suggest a fundamental difference between a cost-plus contract and incentive contracts, as there is a risk of costly distortion where incentives are introduced. Therefore, solutions close to cost plus will be dominated by cost-plus contracts.

Schwartz and Watson (2004) use a legal framework to explain simple contracts, arguing that contract law, such as the prohibition of contract renegotiation bans, discourages complex contractual forms by making renegotiation relatively inexpensive (Hensher et al., 2016). There is a trade-off between the costs of contract complexity with gains from efficient investment incentives where higher contracting costs result in simpler contracts. In addition, agents have preferences for high or low renegotiation costs depending on the complexity of a contract, where a complex contract requires high renegotiation costs to retain the incentive scheme.
So, should incentive contracts be used more often? Dye and Sridhar (2005) uses moral hazard severity to suggest that simple contracts can be optimal, despite the potentially vast array of performance measures that are ‘marginally informative’ (see Holmstrom, 1979). Paul and Gutierrez (2005) looking from a practitioner angle, however, disagree. Hensher et al. (2016) investigated this in the bus context. Using a stated choice experiment and a mixed logit model to account for operator preference heterogeneity, the findings offer informative guidance to bus operators (and regulators) in preferences for specific performance-based contracts given their attitudes towards contracts that require them to bear some risk in return for a higher margin when meeting the performance standard specified. Given prior views, reflected in operator preferences, on the likelihood of performance requirements being achieved by the operator, the regulatory authority can use this evidence to identify the likely reaction of bus operators to varying margins and associated bonuses and penalties. This provides valuable insights into the extent to which an operator awarded a contract under the specific financial offer (regulating the specific base margin, bonus and penalty), with the specific risk profile, is likely to prefer and accept the contract.

A simple model can be used to construct a number of alternative performance-based contracts (PBCs) which will reveal the contract that is most likely to be preferred by the operator (as well as suggesting contracts where operators would be neither worse off nor better off). The following formula, from Hensher et al. (2016), based on a sample of 64 operators in Australia, can be used by regulators as an additional (behavioural) tool to garner knowledge on the likely support from operators (in a trusted partnership) for specific risk profiles associated with contracts under consideration.

\[
U_{\text{contract}} = 0.5574 \times \text{Base (profit) margin as percentage markup on costs} + 0.8339 \times \text{Bonus under current level of effort \% \times Chance of occurring} - 0.7846 \times \text{Penalty under extra effort \% \times Chance of occurring}
\]

Knowing the operator level of utility associated with each of the potential PBCs, the regulatory authority can design a contract to give the operator a reasonable incentive and amount of risk for increasing effort and achieving performance requirements. For example, if the current contract is formulated in such a way that all the operator costs are reimbursed and the operators are provided with a stipulated fee for providing the services (i.e., cost-plus contracts), the regulator can estimate the base margin (stipulated fee/operation costs) and feed this into the equation to compute the operator’s current level of satisfaction (or utility). In the next round of negotiation or competitive tendering, if the regulator desires operators to increase their efforts in order to achieve a predefined objective, for example, growing patronage and/or increasing service reliability, the authority can design a contract in which the chances of receiving a bonus/penalty at the current/increased levels of effort are controlled via performance indicators specified via contract clauses. The contract parameters that the authority needs to determine are the level of bonus (consistent with the objective) and penalty (when failing to achieve the predefined objective) required to ensure the operator’s level of utility per the current contract.

Vigren and Pyddoke (2020) suggest that although the conceptual literature suggests that passenger incentives could increase public transport ridership, the few studies evaluating real contract outcomes are less positive, as none has yet been able to attribute increased ridership to passenger incentive contracts.

As an example of a practical effort to build incentives into contracts, the impacts that contract design has had on the performance of Santiago’s (Chile) public transport system, Transantiago, over the last 13 years are considered, drawing on the findings in Batarce and
Ávila (2019). Transantiago was implemented in 2007 through a public bidding process that awarded five groups of trunk bus lines and nine groups of feeder bus lines to 11 companies, totalling approximately 4,600 buses. Several contract modifications were made in the early years of operation, including the incorporation of performance indicators for provided capacity, frequency, and regularity. To meet this objective, an analysis of all contracts was conducted, starting with the 2012 renegotiation through the last quarter of 2016, focusing on the structure of the financial incentives in the concession contracts, as these largely determine operators’ performance and the effectiveness of the contract changes (Gómez-Lobo & Briones, 2014). The financial incentives were analysed from the perspective of how operators receive revenue because these determine the quality of the operators’ service delivery (Sappington, 2005).

A system performance audit examining operator revenue, compliance indicators, evolution of payment variables and fines showed that the financial incentives had not been effective. This failure is reflected in a low-quality transport service in which operators achieved steady revenue growth despite their failure to meet expected performance levels. During the period analysed, most of the contractual modifications increased the payment per passenger, rewarding operators financially more than the fines paid for not complying with minimum quality requirements. In addition, the contract incentives were leveraged by operators to benefit themselves and reduce user benefits. For example, operators attained a high performance score for frequency by not stopping at all bus stops, similar to the many settings in which on-time running is the only performance metric subject to fines (as in Australia). Such a contract clearly protects the operators’ revenue, giving them no incentive to improve their services. However, the incentives for adding new vehicles and increasing the size of the bus fleet did have a positive impact, as the buses emitting the most pollution were removed from service, and the fleet grew because of an increase in the amount paid per driven kilometre. Since 2012, the contracts with operators have become more like gross cost contracts with quality incentives, with payment linked to quality compliance. The payable driven kilometres were specified in each operator’s operation plan according to a series of contract requirements. The quality-related requirements were wait times, occupancy rates and overcrowding rates. The problem of incentives to provide quality in the Santiago bus system, however, is that the revenues obtained by providing more quality are lower than the costs incurred. Batarce and Ávila (2019) recommend that incentives, essentially payments per passenger or kilometre, be determined based on the bus operator’s costs and the sensitivity of demand to service quality, a theme promoted by Hensher and Prioni (2002) more than 18 years ago.

Hensher and Prioni (2002) developed a way of measuring service quality that results in an intuitively appealing formula that is transparent, is incentive compatible, is easy to administer and monitor and can be integrated into the specification of a competitive tender. Known as the service quality index (SQI), it provides a mechanism to benchmark service quality on a number of criteria and offers various ways to improve on service quality where it falls short of best practice, after controlling for differences in operating environment. An identification of SQI prior to tendering would allow the responsible authority to gain information on customers’ satisfaction with the current levels of service quality and to include this information in the form of service quality targets in the contract specification.

Table 1.1, adapted from Hensher and Prioni (2002), gives an example of how one might integrate SQI targets into the tender process. The weights attached to each of the studied service quality attributes were obtained from a stated choice preference experiment estimated as a simple multinomial logit model. Let us assume that from a survey of a sample of existing users, the user-defined quality of current service of three operators is identified. Operator 1 achieved an SQI of 1.4 by providing a service that is on average two minutes late, clean enough for 60%
of the sampled users and costs on average $2.1. Operators 2 and 3 have SQIs respectively of 1.3 and 2.0. Assuming that these operators are comparable, Operator 3 is best practice. Regulators can use the SQI in the contract design to specify how much service improvement they require relative to the current levels as illustrated in the last two columns of Table 1.1. Although one might impose the requirement that each and every bus operator must be at best practice, this may discourage bidders, and so it is preferable to set a target level that is recognised as achievable by potential bidders. The level should be incentive compatible.

Given the gap between an operator’s SQI and that of best practice (e.g., 0.6 for Operator 3), a formulation $\text{SQI} + z$, where $z$ is the predesignated improvement over a period of time (e.g., 0.2 in both subperiods), is suggested. The $\text{SQI} + z$ formula provides a target in line with a predesignated increase in the service quality level. In the case of the service previously provided by incumbent Operator 1, authorities impose an SQI target of 1.6 after 2.5 years and a final SQI target of 1.8 at the end of the contract (5 years).

Other experiences around the world are consistent with the results described previously. In Sweden, for example, Jansson and Pyddoke (2010) analysed the effects of contract incentives on the quality of the transport system in terms of punctuality and cancelled bus and train trips. Their study concluded that the Stockholm transport authority’s incentives were weak, as the monetary amounts of rewards and fines were very small and did not influence operator behaviour. In England, Gómez-Lobo and Briones (2014) demonstrated the importance of including quality incentives in contracts to prevent concession holders from benefiting at the expense of high-quality service delivery. The study revealed significant improvement in the system since 2000, which was when the London transport authority included quality incentives in its contracts for distance travelled and for performance indicators such as schedule compliance and punctuality. The authority also included the incentive of a two-year contract extension if an operator exceeded performance standards.

The regulatory experiences of Stockholm and London highlight the importance of including compliance indicators and financial incentives in contracts in order to improve the quality of the system. These indicators must measure compliance with standards for regularity, frequency, agreed-upon demand levels, driven kilometres, fleet status and more, desirably within an SQI framework that accounts for the role that each service dimension plays in customer satisfaction. Implementing this type of contract requires a control and monitoring mechanism that enables the measurement of actual versus expected performance and then linking the performance achieved to penalties and rewards that influence the behaviour of the service providers. This provides an introduction to actionable benchmarking.

<table>
<thead>
<tr>
<th>Operator</th>
<th>Reliability</th>
<th>Bus fare</th>
<th>Clean enough</th>
<th>Travel time</th>
<th>Etc.</th>
<th>Realised</th>
<th>2.5 yrs.</th>
<th>5 yrs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2 minutes late</td>
<td>2.1</td>
<td>60%</td>
<td>25 minutes</td>
<td>. .</td>
<td>1.4</td>
<td>1.6</td>
<td>1.8</td>
</tr>
<tr>
<td>2</td>
<td>1 minutes late</td>
<td>2.4</td>
<td>78%</td>
<td>26 minutes</td>
<td>. .</td>
<td>1.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>1 minutes late</td>
<td>2.0</td>
<td>80%</td>
<td>21 minutes</td>
<td>. .</td>
<td>2.0</td>
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</tr>
</tbody>
</table>
Regulatory frameworks in public transport

Actionable benchmarking as part of an effective regulatory toolkit

Regardless of what procurement model is used, the need to monitor performance remains unquestionable not only to ensure that the agreed-upon performance is maintained (and can be improved on) throughout the duration of a contract but as a way of providing information that the regulator can use to improve practice and especially to develop an actionable benchmarking program to ensure that best practice outcomes in terms of cost efficiency, network effectiveness and customer satisfaction are achieved. Data from the Sydney metropolitan and outer metropolitan areas for 25 contract regions is used to illustrate how this works in practice.

The two concepts of particular regulatory interest are efficiency and effectiveness (Table 1.2). Efficiency (*doing things right*) may be considered in cost per vehicle/service kilometre terms as intermediate outputs in the supply chain. Effectiveness (*doing the right things*), on the other hand, is a productivity measure which may be related to passenger kilometres/trips delivered per vehicle kilometre. The latter recognises that whilst minimising costs is important, the end objective of public transport is to move people (not just vehicles) for a given budget.

To measure the cost efficiency of bus operations, there is a need to identify the features of service provision that incur a disproportionate cost impact on an operating region and are in effect the reality of operating in that specific jurisdiction which the operator has no effective control over. It is therefore necessary to recognise and account for these differences in a process called *normalisation* (not to be confused with standardisation) to make valid comparisons. Herein lies the difference between the actual gross cost and normalised net cost of bus operations (not to be confused with net cost contracts).

In the context of metropolitan and outer metropolitan bus operations in Australia (suspected to be the case in most countries), the main influences that are outside the control of an operator are: (i) the speed on the road (often the result of traffic congestion but also road alignments, including traffic lights and level of bus priority); (ii) the amount of in-service kilometres you can get out of each bus each year (called bus utilisation and influenced by depot location), which impacts the amount of capital and hence capital cost and (iii) the spread of service hours, which can be defined to describe the proportion of service hours on evenings and weekends when higher labour costs associated with penalty rates are typically incurred. The method used to normalise the results is explained in detail in Hensher (2018).

The average gross and net cost per in-service kilometre is compared in Figure 1.1 for bus operators for Sydney (Metro and Outer Metropolitan), Brisbane, Perth and Adelaide. Government operators, whose labour costs are generally 25–40% higher due to more rigid work practices, political interference and the sheer staff-to-bus ratio, have been excluded from the sample. In competitively tendered metropolitan Sydney, gross costs are high due to congestion, but on a net cost basis, the bus operators are more effective than in outer metropolitan Sydney, where bus contracts up to 2014 are negotiated. Net cost in Brisbane (where all contracts are

<table>
<thead>
<tr>
<th>Inefficient</th>
<th>Efficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ineffective</td>
<td>Pursuing the wrong goals (e.g., satisficing behaviour) for very high cost</td>
</tr>
<tr>
<td>Effective</td>
<td>Achieving the right goals (e.g., maximising patronage) but at high cost</td>
</tr>
</tbody>
</table>
negotiated) is significantly higher than gross cost, reflecting typically higher average speeds and higher bus utilisation, probably attributable to the bus priority afforded by its busway system (Hensher et al., 2020). Bus services in Perth (all tendered) are the most expensive to procure based on this analysis. The average cost for metro/outer bus operators in Australia for 2017 was $4.58 per service kilometre.

The three operating differences can either have a favourable or unfavourable impact on the operating costs of a contract region. Looking now in more detail for all 25 contracts in the Sydney and Outer Sydney metropolitan areas which includes four government operator contract regions, Figure 1.2 shows the degree of variance for each contract region between the operating measures and the industry average. A positive variance means the operating difference has a favourable impact on costs (i.e., reduces costs) relative to the industry average. In simple terms, the effect of normalisation will be to increase cost efficiency which has favourable variances in operating differences relative to the industry average. However, in practice, the overall net effect of normalising for the three operating differences is a complex function of the variances in each operating difference relative to the industry average; the influence each operating difference has on costs, measured through correlation and the gap between the gross cost efficiency and the industry average. Nevertheless, knowing that average peak speed has a major influence on the differences in gross cost efficiency, the direction of change can be anticipated in the normalised or ‘net’ cost efficiency key performance indicator (KPI). Specifically, for Contract Regions 5–9 and 13, the net cost efficiency should be reduced to normalise for their unfavourable average peak speeds, and, conversely, the net cost efficiency for Contract Regions 16, 17 and 18 should increase to normalise for their favourable average peak speeds; however, this will be somewhat mitigated by unfavourable vehicle utilisation in the case of Contract Regions 16 and 17. A comparison of gross and net cost efficiency for each contract region is provided in Figure 1.3 for the 2012 financial year, the last year that the author had access to performance data.3

The ranking of industry cost efficiency can be presented in a number of different ways to identify poorer-performing operators: simple ranking of first to last, quartile analysis with identification of contract regions in the bottom quartile or relative to the industry median.
Figure 1.2 Variances in operating differences compared to industry average

Figure 1.3 Comparison of gross and net cost efficiency KPIs for financial year 2012

Figure 1.4 shows the net cost efficiency relative to the industry median of $5.39 per service kilometre and highlights which operators are potentially inefficient (above the median).

The network effectiveness or productivity of the bus and coach industry can be assessed by comparing passengers carried and vehicle kilometres travelled. Network effectiveness (boardings per service kilometre [Figure 1.5]) is a key results area which both government and operator can influence through service review processes and their respective influence on the drivers of patronage growth. In this respect, the operator is best placed to manage service quality and reliability to make bus services more attractive for both existing and new users. The highest network effectiveness is achieved in the four State Transit metropolitan contract areas, reflecting their high-density central business district commuter services and greater patronage potential in their catchment areas. Most other contract areas fall in the range of 0.5 to 1.0 boardings per service kilometre.
Only one outer-metropolitan contract area is in the top ten: R20. The five lowest performers are all outer-metropolitan contract regions: R23, R18, R16, R19 and R17. For network effectiveness, around 21 regions have shown a decrease in service kilometres from 2011 to 2012, this following an increase in the previous period, but for many of the regions, the number of boardings has either decreased or not experienced increases of the same magnitude, meaning most regions have shown a decline in this measure.

**Conclusions**

In concluding this chapter, the future is contemplated in terms of where competition and ownership under a regulatory framework in the bus sector might head. Wong and Hensher (2018)
envisaged a number of issues which may emerge to become important policy areas over the next
30 years, related to multimodal contracts, access contracts, next-generation economic deregula-
tion, intermediate mode regulation, autonomous vehicle regulation and Mobility as a Service
(MaaS) (see also Chapter 3).

A move across government to enlarge contract regions and include complementary modes to
enhance system integration and the customer experience is starting to be seen. This opens up
opportunities for the private sector to form joint ventures to compete for these larger contract
offerings. Access contracts to rail and bus rapid transit hubs provide a way for operators looking
at expanding their service offerings to cover the first/last mile to/from stations, whether this be
in the form of fixed-route buses, flexible bus services (microtransit), carsharing or cycle hire (see
also Chapters 17 and 22). The implications of this on existing public transport demand and con-
tracts remain unclear. In Australia, though, Sydney’s Region 6 contract offering is a pioneering
first of its kind to combine fixed-route buses and on-demand services (Perera et al., 2019).

Under the next-generation economic deregulation, public transport contracts are shifting
from their output-based form (delivering kilometres on defined modes) to outcome-based
models which seek to deliver accessibility using any mode, maximising for network efficiency.
There are opportunities to combine elements of competitive tendering and autonomous market
initiative to create the next-generation service delivery model. In addition, intermediate mode
regulation is becoming important with the growth in ridesourcing and microtransit provided
by transportation network companies (and to a lesser extent cycle hire and carsharing) who
have had to battle outdated regulation to become mainstream. Opportunities exist for a more
streamlined approach based on a common platform and incentive payments to better integrate
intermediate modes with other modes (e.g., public transport). The ownership model for auton-
omous vehicles, including buses, will determine its implications for productivity, traffic conges-
tion, road capacity and the urban form. Regulations and incentives can help pool vehicles and
move the community towards shared mobility. Pricing signals can help discourage autonomous
zero occupancy deadheading – the influx of which will clog cities.

Mobility as a Service contracts are also gaining great interest. This entails a personalised,
one-stop travel management platform digitally unifying trip creation, purchase and delivery
across all modes which can help move people away from vehicle ownership towards mobility
consumed as a service. Mode-agnostic mobility contracts offered by brokers/aggregators (Wong
et al., 2019) of the system to suppliers of transport assets/capacity can help deliver such a service.
There will also be the opportunity to implement road pricing defined by time of day, geography
and modal efficiency within this system to help optimise for network efficiency (Wong et al.,
2020), including, for instance, preventing an influx of point-to-point transport.

The COVID-19 pandemic has changed the public transport landscape, with significant
reductions in patronage due to both mandated social distancing and government messaging
that people should stay away from public transport as a shared mode until advised otherwise
(see Beck & Hensher, 2020). We saw drops as low as 20 percent of pre-COVID-19 levels over
the March to May 2020 period in many countries, with some slow increase as restrictions have
been relaxed in a number of countries. So what does this mean for public transport regulation,
especially the contracting regime? Where there is gross cost contracting, governments have
carried the burden of lost revenue from the fare box, which has been a saviour, allowing many
public transport services to continue at their post-COVID-19 levels, although how long this
can continue if patronage does not return to acceptable levels is unknown. In some jurisdic-
tions, for example, in the UK rail setting, governments have switched out of net cost franchise
arrangements for a while to support rail services under a revised gross cost contract regime (see
also Chapter 14). This added burden on the state, in some sense, aligns with the public interest
David A. Hensher

theories of regulation discussed in this chapter, which assume that sufficient information and appropriate enforcement powers exist to ensure that the public interest is enhanced by an essentially benevolent regulator, at least during a period of significant disruption and uncertainty.

Acknowledgements

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Notes

1 If regulatory agencies come to be dominated by the industries or interests they are charged with regulating, the result is that an agency, charged with acting in the public interest, instead acts in ways that benefit the industry it is supposed to be regulating.

2 Bus travel time, fare, ticket type, frequency, arrival time at bus stop, walking time to bus stop, seat availability, information at bus stop, access to vehicle, bus stop facilities, temperature on bus, driver attitude and general cleanliness on board.

3 Since 2012, there have been a number of changes in operators, associated with direct selling of businesses but also to changes through competitive tendering, the latter under the Sydney and not Outer Sydney contracts.

References


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