

Infrastructure Development Post Covid-19

PPP Contracts and Design Issues

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Infrastructure plays a critical role in any economy's growth and development. That is why, infrastructure development is necessary (but not sufficient) to sustain the growth path in the long run. Infrastructure development, however, has an immediate effect in the short run too by generating employment through construction activities. Income generation through employment and backward linkages can lead to higher consumption demand that, in turn, can boost the overall demand.

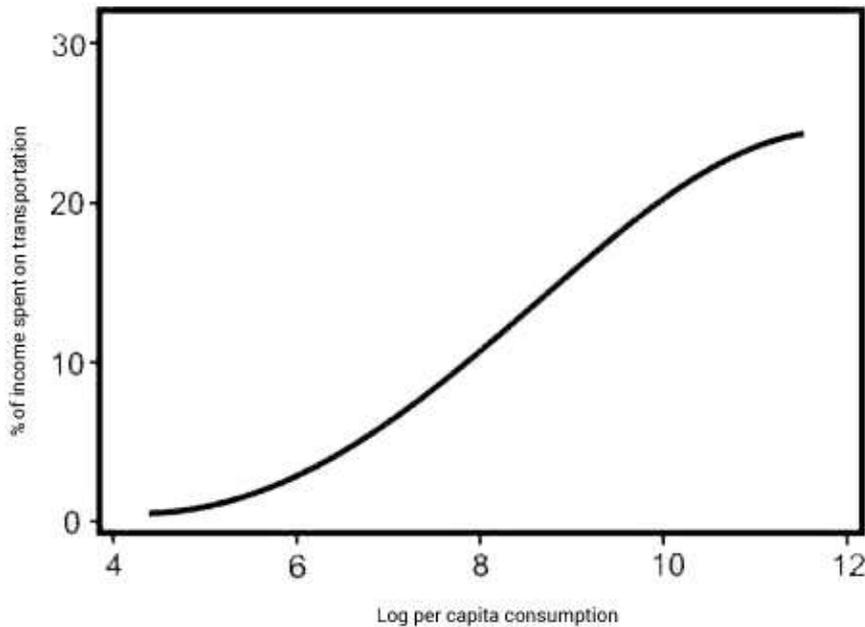
The literature highlights the following two key empirical observations based on the projections for worldwide consumption and its components, grounded on microeconomic estimates of how spending patterns change as total consumption rises:

- linear relationship between the logarithm of total individual consumption and the share of spending on food; and
- nonlinear relation between individual incomes and the share of spending on transportation, which along with associated energy requirements, forms a major component of infrastructure.

Given that the first estimated relationship is in line with the received wisdom, let us focus on the second. The relationship is S-shaped; initially it is convex, signifying that the share of spending on transportation increases steeply as income increases, and then it becomes concave, implying that the share of spending on transportation rises less steeply as satiation sets in, as shown in Figure 1.

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Figure 1**Share of income spent on transportation versus logarithm of per capita total consumption**

Source: Based on Hellebrandt & Mauro (2015).

Tomas Hellebrandt & Paolo Mauro. 2015. *World on the move: The changing global income distribution and its implications for consumption patterns and public policies* (Policy Brief 15-21). Peterson Institute for International Economics.

One can broadly conclude that developing countries exhibit convexity while richer countries exhibit concavity. Turning to India, in particular, the spending on transportation is projected to increase by a factor of four (compared to factor of three for China). In numbers, that cumulative increase in transportation as a share of total initial consumption, between 2013 and 2035, is 46.3% (Hellebrandt & Mauro, 2015). The expected high growth in transportation expenditure in India for the next two decades would need to be complemented by developing the requisite infrastructure in order to have larger economic impact.

¹ Infrastructure is of two types:
 i. human or social infrastructure; and
 ii. physical or economic infrastructure.
 Human infrastructure comprises sectors like education and health, whereas physical infrastructure consists of various sectors, like roads, ports, airports, telecommunications, power, water, and sanitation. Each sector has its own peculiarities and specific challenges.

Within India, Tamil Nadu is among the fastest growing in this specific sector. Such a massive increase in transportation would necessitate huge investment in infrastructure.¹ Financing of physical infrastructure has its own issues. It usually requires substantial investments with high fixed capital and large sunk costs, which gives rise to 'natural monopoly' and requires economies of scale. The investments in this type of infrastructure usually have long gestation

Darrin Grimsey & Mervyn K. Lewis. 2004. *Public private partnerships: The worldwide revolution in infrastructure provision and project finance*. Edward Elgar.

²Government of Tamil Nadu. 2012. *Vision Tamil Nadu 2023: Strategic plan for infrastructure development in Tamil Nadu*.

periods, non-recourse or limited recourse to lending along with various kinds of risks, and are in the nature of a public good (Grimsey & Lewis, 2004).

Tamil Nadu's *Vision 2023 for Infrastructure Development*² acknowledges the fiscal limitations of the state, and therefore, encourages private investment through the public-private partnership (PPP) model. The vision plan expects a major contribution (more than 40%) from private participation, which is more than the state contribution (i.e., less than 30%) in total investment for the infrastructure. To overcome the recessionary mode of the economy due to the Covid-19 pandemic, Tamil Nadu may immediately focus on restarting construction in the infrastructure sector to complete all the remaining projects under the vision plan.

Challenges of private investment in infrastructure

Relying on private investment for infrastructure development through the PPP model has its own challenges. The PPP model is complex in nature, and the success of this model depends on many factors. Hence, the designing of the PPP programme is crucial for its successful implementation. It needs supportive institutional system and has to balance various aspects, such as risk sharing, selection of suitable partner, risk pricing or risk premium, government guarantees, incomplete contracts, governance and regulation (a new role for the government under PPP), and contract renegotiations. This paper discusses a few issues that are faced by the Indian PPP programme for its highways development, and the lessons from the Indian experience, which can help to improve the designing of an overall PPP framework for Tamil Nadu.

Institutional support

Effective institutional framework designed to support the PPP model is a prerequisite for its successful implementation. Institutional framework includes laws and policies, transparency and competition in the selection process, and political support and acceptability. Public agencies involved in PPP should have the requisite capabilities of planning and executing PPP projects, along with an effective dispute resolution system in place. Financial markets should also be flexible enough to fulfil the requirements of PPP project financing (Li et al., 2005).

Bing Li, A. Akintoye, P.J. Edwards, and C. Hardcastle. 2005. *Critical success factors for PPP/PFI projects in the UK construction industry*. *Construction Management and Economics*. 23(5): 459–471.

Understanding the risks

Achieving ‘value for money’³ in the PPP model depends on the identification and allocation of risks appropriately. Who bears the bulk of risks—government or

³ ‘Value for money’ is the concept used by several public agencies or organisations (such as World Bank, OECD, and government departments) to judge the suitability of the PPP model to provide public infrastructure. Value for money calculates the expected benefits and costs during the life cycle of the project under the PPP model vis-à-vis the traditional methods of procuring the public infrastructure (Darrin Grimsey & Mervyn K. Lewis. 2005. *Are public private partnerships value for money? Accounting Forum*. 29(4): 345–378; Organisation for Economic Co-operation and Development. 2008. *Public-private partnerships: In pursuit of risk sharing and value for money*). However, there is no uniformity across the countries or organisations to measure it (Philippe Burger & Ian Hawkesworth. 2011. *How to attain value for money: Comparing PPP and traditional infrastructure public procurement. OECD Journal on Budgeting*. 2011/1: 1–56.)

Mark A. Moore, Anthony E. Boardman, & Aidan R. Vining. 2017. *Analyzing risk in PPP provision of utility services: A social welfare perspective. Utilities Policy*. 48 (October): 210–218.

Kumar V. Pratap. 2013. *Delhi Airport Metro fiasco: What can be done to redeem the project? Economic and Political Weekly*. 48(49): 18–20.

private parties—makes the PPP model different from the traditional procurement method of infrastructure. Allocating risks to the private party, who can manage it better than the other partner, is the sign of better risk management. Failure to do so translates into financial costs, because lower the capacity to manage the risk, higher the cost to handle it and thus lesser the value for money (Organisation for Economic Co-operation and Development [OECD], 2008). However, bearing these risks can have social costs in terms of loss in overall social welfare. These costs can be compensated by better risk allocation that carries powerful incentives to generate substantial benefits through technical efficiency (Moore, Boardman, & Vining, 2017).

PPP projects carry a number of risks. These can be classified into two broad categories.

- Some risks are related to projects, and these ‘endogenous’ risks can be controlled by project promoters. These risks are considered the driver to achieve efficiency in the PPP model.
- Some risks, like legal, political, regulatory, and environment risks, are ‘exogenous’ risks (or global in nature), as these risks are beyond the control of project sponsors or promoters. Improper risk sharing may result in disputes that, in turn, can lead to project failures.

The case of Delhi Airport Metro Express is, perhaps, a suitable example to explain it, where the improper risk allocation (along with other factors too) steered the project into dispute, and later on, led to the cancellation of the project partnership. Therefore, understanding the risks effectively are paramount for the success of private participation in infrastructure (Pratap, 2013).

Government guarantees

A government guarantee is a legal obligation for the government to pay out a known or unknown payment in the case of a specific event. PPPs often need the support of government guarantees, which carry considerable uncertainty for the

Ashoka Mody & Dilip K. Patro. 1996.
Valuing and accounting
for loan guarantees.
The World Bank Research Observer.
11(1): 119–142.

Organisation for Economic Co-operation
and Development. 2008.
*Public-private partnerships: In pursuit of
risk sharing and value for money*.

government because it remains unclear how much the government will have to pay for the services provided. This uncertainty largely depends on the risk allocation, as more the risk taken by the government, higher the obligations, guarantees, or contingent liabilities the government will have (Mody & Patro, 1996; OECD, 2008). As the PPP model differs from the traditional method of procurement on the range of risks assumed by government, it would be prudent for the government to take only global (exogenous) risks.

Failure to do so can result in serious financial and other implications, as was the case in the Delhi–Noida Toll Bridge project. Here, the government (sponsoring agency) guaranteed 20% annual returns to the concessionaire over and above its actual costs. That left little incentives for the private partner to control its construction and maintenance costs. As a result, the initial project tenure of 30 years has been increasing—currently over 70 years and may increase further—to recover its complete costs and the guaranteed profit (Pargal, 2007).

Sheoli Pargal. 2007.
*Concession for the Delhi Noida bridge
(Case Study)*. Planning Commission,
Government of India.

Staff Team Led by Richard Hemming.
2006. *Public-private partnerships,
government guarantees, and fiscal risk*.
International Monetary Fund.

Darrin Grimsey & Mervyn K. Lewis. 2005.
*Are public private partnerships
value for money?*
Accounting Forum. 29(4): 345–378.

In the PPP model, guarantees have been seen as one of the modes of government intervention, but it often carries significant fiscal consequences in terms of contingent liabilities arising from assuming the risks (Hemming et al., 2006). Another major issue is the accounting of these guarantees, as it is difficult to measure the exact payment obligations under these contingent liabilities for the government (Grimsey & Lewis, 2005).

Contract design/choice

The PPP is, in simple terms, a contractual relationship between the government and the private player, and the contract plays a central role to draw the best out of this partnership. The contract design, therefore, needs special attention to deliver the expected outcomes. PPP contracts are usually of long term, which spans 15–30 years of periods, and it involves many complexities and uncertainties. It is hard to

foresee the future conditions and requirements of a particular service⁴ at the time of contract awarding, which makes it difficult to develop fully specified contracts. Hence, PPP contracts, by nature, are incomplete contracts.

In the case of PPP, where each project is stand-alone, private players remain under tight budget schedules of the independent project. Profit-seeking promoters would compel

⁴For example, it was very difficult to predict in early 1990s about the uses of computerised electronic equipment for toll collections on roads, which helped to reduce congestions and improve operational efficiency. In all the upcoming projects of national highways, the use of these techniques is mandatory.

their managers to bring in efficient methods to increase the probability and quantum of profit (Fourie & Burger, 2000). It, however, can lead to compromise on quality. A well-specified contract with all the required quality parameters can reduce the possibility of quality compromise. It, however, makes these long-term contracts inflexible. Requisite quality and quantity of service need to be specified in the contract, and payment to the private partner is conditioned to the delivery of that service. Since the contracted specifications (including both quality and quantity) are subject to change overtime, in such circumstances, the inflexibility and the long-term nature of PPP contracts may bound the government to follow a cost-ineffective way to achieve the desired services (OECD, 2008). Or if it goes to renegotiation, then post-negotiation distribution of benefits depend on the power relation designed in the contract (Lonsdale, 2005).

F. Cvn Fourie & P. Burger. 2000.
An economic analysis and assessment
of public-private partnerships (PPPs).
South African Journal of Economics.
68(4): 305–316.

Organisation for Economic Co-operation
and Development. 2008.
*Public-private partnerships: In pursuit of risk
sharing and value for money*.

Chris Lonsdale. 2005.
Contractual uncertainty, power
and public contracting.
Journal of Public Policy. 25(2): 219–240.

Uncertainties and complexities make incomplete contracts prone to opportunism and hold-up. Contract theory suggests many implicit and explicit ways to prevent such behaviour. Cases of Chennai–Tada or Panipat–Jalandhar highways projects under the National Highways Authority of India highlight the possibilities of opportunism or hold-up–like situation using the complex nature of the contract. Both the projects went through lengthy litigation to force the concessionaires to complete the projects but could not fetch the desired results. Finally, the court ordered to terminate the Chennai–Tada project. The Panipat–Jalandhar project is still work-in-progress, even after completing two thirds of its contract tenure and taking its share of revenue (Kumar, 2018a).

Chandan Kumar. 2018a.
*Opportunism and hold-up in the incomplete
public private partnership (PPP) contracts*
(Working Paper 2018-012). Indira Gandhi
Institute of Development Research.

Selecting the right private partner

For the success of the PPP model, selection of the right private partner is as important as appropriate risk allocation. The selection of the private partner usually takes place through an evaluation criterion (also called as bidding criterion). The bidding criterion could be the project cost, contract tenure, subsidy grant, revenue sharing, or something else. To attract the best private player, the bidding criterion and bidding process should be transparent, competitive, and innovative so as to select the most efficient player among the bidders. The synergy between bidding criterion, contract agreement, and institutional set-up is also crucial in order to bring the best out of the contractual relationship.

Lessons from Indian highways contracts

In the 1990s, when India was one of the fastest growing economies of the world, it needed strong infrastructure support to maintain high economic growth. Owing to huge infrastructure investment requirement, Indian policies moved swiftly towards the PPP model to attract private investment into infrastructure development. Its recent plan—Bharatmala Pariyojana—too expects private investment in highways development, though with relatively lower share of private investment (around 15%) due to issues in the implementation of the PPP programme.

Under its PPP programme (before the Bharatmala Pariyojana), India adopted three different contract models: Toll, Annuity, and Operations & Maintenance (O&M) contracts. However, if one looks at actual numbers with regard to the share of these contracts, Toll is close to 75% of total projects, whereas Annuity accounts for around 20%, and O&M projects are roughly 5–6%.

⁵ Recently, India experimented with the Annuity contract by modifying its financing structure. In the modified contracts—called Hybrid Annuity Model—the government supports the private partner with the upfront 40% financial contribution of the total project cost during the construction phase, and the rest 60% paid in terms of annuity payments while the project is under the operation period. As this modified model is at its nascent stage, the performance and outcomes of this model will unfold in the future.

For the first two (Toll and Annuity⁵) contract models, the contractor is responsible for the engineering, procurement of materials, construction, and maintenance of the project. The key difference between Toll and Annuity is that in the case of Toll, the traffic/commercial risks are borne by the concessionaire, and the investment is sustained by toll revenues, while in Annuity projects, all costs are borne by the government in the form of deferred budgetary payments. In the case of Toll, government budgetary support, if any, is restricted to an upfront grant, while in some cases the concessionaire may even pay the granting authority a one-off fee as part of the concession grant. In the case of Annuity, the concessionaire relies on annuity payments determined by

competitive bidding and made out of budgetary allocations spread over time. The third type (O&M) of contract involves only operation and maintenance of the project, and here the contractor bears the traffic/commercial risk; the contractor does not have the responsibility of road construction.

Effect of the highways contract choice

Two sets of contracts (Toll and Annuity), which are designed for the same task and implemented under similar conditions, are different in the contract governance attributes. Under the Toll contract, private players recover their cost from user (toll) charges, hence they bear the demand or commercial risk of the project, whereas for the Annuity contract, government pays pre-determined annuity payments to recover the investment without any payment risk for the

private partner. Another major difference between these contracts is the incentives and penalty given for timely completion; in addition to that, an extra support to mitigate the demand risk (up to an extent) for the Toll contracts is built in. A performance comparison between Toll and Annuity contracts highlights that the Annuity contracts that have relatively better incentive structure and stringent administrative controls are better performing (than the Toll contracts) in terms of timely delivery of the projects and minimising the cost overruns. The probabilities of time overrun and cost overrun—and their magnitudes too—are relatively higher in the Toll contracts as compared to the Annuity contracts, due to tighter budget constraints in the latter contracts (Kumar, 2018b).

Chandan Kumar. 2018b.
Effects of contract governance on public private partnership (PPP) performance
 (Working Paper 2018-014). Indira Gandhi
 Institute of Development Research.

Impact of contractual checks and balances

Within the Toll type of contracts, India followed two subtypes of contracts. The incentive structure to deliver the project on time differs in both subtypes of contracts. In other words, the risk of delaying the project delivery and its impact on project revenue are allocated differently, but with the same level of penalty. In the one set of contracts, this risk is directly linked to the duration of toll collection, whereas, it is disconnected in the other set of contracts. So, they are called Linked and Delinked projects, respectively. The risk disconnection in Delinked projects raises the scope of opportunism of not delivering the project on time.

Comparing the contract designs of the two subtypes of the toll projects, and analysing the strengths and weaknesses to avoid opportunism or hold-up, it is observed that the same level of penalty may not be suitable to all types of contracts. Each type of contract should have its own self-enforcing range to make it incentive compatible, where contracting parties should lose if they breach or disrespect the contractual commitments.

Results from the empirical exercise confirm these findings from an analytical framework. The delinked contracts were adopted majorly for financial reasons, without incorporating much checks and balances in the contract while giving the rights to collect revenue from the beginning. The low probability of timely completion and longer time overruns in the Delinked projects indicate the possibility of opportunism. A further analysis of Delinked contracts shows how the same set of companies (which have both types of contracts in their portfolio) could exploit the incorrectly-specified Delinked contract to create a hold-up-like situation. It leaves us with an important lesson, as contract theory suggests, that extra leverage should be given with more accountability and better checks (Kumar, 2018a).

Chandan Kumar. 2018a.
Opportunism and hold-up in the incomplete public private partnership (PPP) contracts
 (Working Paper 2018-012). Indira Gandhi
 Institute of Development Research.

Winner's curse and alternative bidding method

The selection of the right partner depends on the selection or evaluation criterion. For Toll model contracts, India followed a premium/subsidy-based method. This bidding method coupled with the incentive structure of the concession agreement can result in overvaluing the projects due to optimism bias. In this method, bidders have to bid on the basis of long-term expectations, where uncertainties for many parameters are high. By design, only the most optimistic bidder (not necessarily the most efficient bidder) wins, and as the optimism fades away, the winner starts facing trouble, which is called winner's curse. This can put the projects under stress or failure, and are quite visible for the Indian PPP Toll projects.

Compared to the existing bidding method, an alternative method (Least Present Value of Revenue [LPVR]) is based on the parameter of total revenue. In this method, bids are invited for the present value of the total revenue calculated on the basis of discount rate predefined by the authority. The project gets awarded to the least value quoting bidder. The bid winner gets the responsibility of building, financing, and maintenance of the road, against the rights of collecting the toll fee from the users. In this method, the duration of contract is variable. If the traffic

Chandan Kumar. 2018c.
Role of bidding method and risk allocation in the performance of public private partnership (PPP) projects
(Working Paper 2018-013). Indira Gandhi
Institute of Development Research.

growth rate is slower than expected, then the contract period is usually for the longer time than the expected and vice-versa. However, the total revenue from the project remains constant. As soon as the concessionaire collects the total revenue (in present value terms) equal to its bid, the contract gets over. It avoids many problems which are quite common

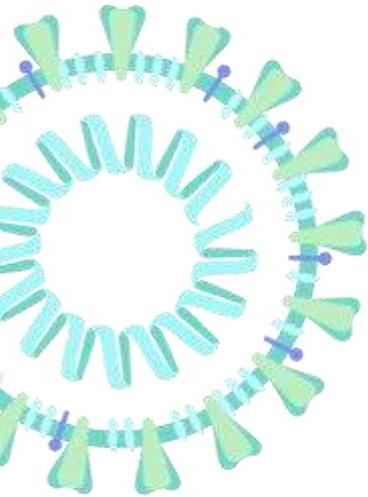
and crucial in infrastructure projects. It also helps to reduce the complexity of the contract (Kumar, 2018c).

Takeaway

Infrastructure development can help Tamil Nadu move on to the faster recovery path by generating employment, and in turn, boost the demand in the short run and also provide the requisite support for its medium- and long-run development. With limited public resources to fulfil other equally compelling social and economic objectives, the state government may have to look for alternatives for financing its infrastructure. Private financing through PPP model can fill this space, but the state government will have to give sufficient attention to the checks and balances highlighted here—that are equally relevant to all infrastructure sectors (roads, urban infrastructure, education, health, or others)—in order to draw the maximum out of the PPP option, without compromising on social welfare.

For comprehensive infrastructure development, Tamil Nadu needs to focus on several sectors within infrastructure and prioritise them. Each sector differs from the rest in inherent risk characteristics, and hence, one set of policies or framework may not be suitable to all. This would necessitate evaluation of sector-specific risk profile, because improper risk allocation can result in disputes or project failures. Moreover, government should be wary of assuming unnecessary risks, as they can translate into long-term contingent liabilities, either for the government or to be borne by the end users. Government guarantees must also be limited to those risks related to government policies.

While deliberating on the institutional framework for the PPP model, contract design or choice is a critical parameter for the successful implementation of the PPP programme for Tamil Nadu. Given the varying requirements of the different infrastructure sectors, one contract choice may not fit all sectors and projects. Hence, each sector would need careful deliberation while designing the contract with sufficient checks and balances in order to make it incentive compatible, where private partners are sufficiently incentivised to carry out the project more efficiently. The contract must have the internal enforcement strength to avoid any opportunism or hold-up kind of situation. Evaluation criterion for selecting the private partner would also be crucial for Tamil Nadu to execute the projects through capable and suitable private partners. The lessons discussed here from the Indian experience of PPP projects can be educative for Tamil Nadu for better design of PPP framework and its infrastructure projects. 🌱



COVID-19 SERIES

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