

Risk Valuation and Allocation for Public–Private Partnerships (P3s)



P3 TOOLKIT

Quick Facts

- In choosing whether to transfer, retain, or share risks, the public agency values each risk, and then evaluates which partner is better able to control, retain, or mitigate the risk factors at the lowest cost.
- It is the transfer of risks that provides incentives to the private entity to innovate in the approach it takes to deliver a project under a P3.

For Further Information

See FHWA's *Risk Assessment for Public–Private Partnerships: A Primer*, available at

http://www.fhwa.dot.gov/ipd/forum/risk_assessment/index.htm

The use of public–private partnerships (P3s) marks a shift away from traditional ways of procuring and financing highway projects. Under the P3 model, a private partner may participate in some combination of design, construction, financing, operations, and maintenance, including the collection of toll revenues.

Under traditional public procurement of highway projects, the public agency retains most of the risks, yet these risks are not usually quantified, nor are their costs always included in the project cost estimates. A key component of P3 procurement involves the transfer of certain risks from the public agency procuring the project to the private sector partner. The concept of “transferring risk” requires that the private partner will be responsible for cost overruns or expenses associated with the occurrence of that risk.

Risk transfer can include, among others, construction risk (i.e., risk that the project will not be completed on time or on budget), usage or traffic demand risk (i.e., risk of lower-than-expected revenues from users of the project), and operation and maintenance risk. For example, if the public agency transfers the risk of construction to the private sector partner, then any cost overruns or delays during construction will be borne by the private sector partner.

In planning for and developing P3 projects, a risk register is often prepared in advance, with public officials choosing among three options for each risk:

- Retain the risk, attempt to mitigate it, and/or insure against it.
- Transfer the risk to the private sector partner.
- Share the risks with the private partner.

In choosing among these options, the public agency values each risk and then evaluates which partner is better able to control, retain, or mitigate the risk factors at the lowest cost.



Risk Identification and Valuation

Risks are often identified and assessed through a series of workshops used to develop a project risk register. The risk register may include a quantitative estimate of the potential financial cost or “risk premium” based on the consequence and likelihood of a risk being realized. Risk valuation is conducted to quantify risks in terms of both cost and time impact by using either formula-based analysis or Monte Carlo simulation.

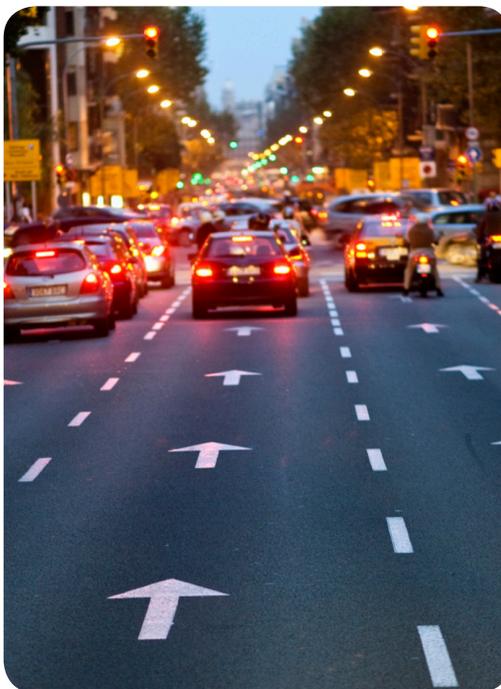
Formula-based analysis uses a simple formula to calculate average risk impact by using minimum, maximum, and most likely cost and schedule impacts. For example, the following formula is used by the Virginia Department of Transportation to calculate the risk value of each individual risk:

$$\text{Risk Value} = \text{Probability of Occurrence} \times (\text{Min. Cost} + \text{Max. Cost} + 4 \times \text{Most Likely Cost}) / 6$$

Monte Carlo simulation uses specialized software for simulation of expected cost and schedule impacts of each risk to get a range of aggregate risk values that the agency may choose from, depending on what confidence threshold is required. This is not possible with a formula-based analysis. The confidence level selected will depend on the stage of assessment, confidence in cost estimates, and complexity of the project.

Risk Allocation

Risk allocation is at the core of P3s, which are structured around the sharing of risks (and rewards) between the public agency and private sector entity. It is the transfer of risks that provides incentives to the private entity to innovate in the approach it takes to deliver a project under a P3. Transferring too little risk to the private sector would constrain the “value for money” that could be achieved. Conversely, transferring too much risk (e.g., a risk that the private sector is unable to manage) will result in high-risk premiums, making the project more costly and driving down the value for money. If a risk is difficult to assess or manage, it may be appropriate to share it between the public and private sectors. Table 1 shows how risk allocation commonly differs for P3 projects (i.e., design–build–finance–operate–maintain projects) relative to traditional procurement (including design–bid–build and design–build).



Risk	Traditional (Design-Bid-Build)	Design-Build	Design-Build Finance-Operate-Maintain
Change in Scope	Public	Public	Public
NEPA Approvals	Public	Public	Public
Permits	Public	Shared	Private
Right of Way	Public	Public	Shared
Utilities	Public	Shared	Shared
Design	Public	Private	Private
Ground Conditions	Public	Public	Private
Hazmat	Public	Public	Shared
Construction	Private	Private	Private
QA/QC	Public	Shared	Private
Security	Public	Public	Shared
Final Acceptance	Public	Private	Private
O&M	Public	Public	Private
Financing	Public	Public	Private
Force Majeure	Public	Shared	Shared

Table 1. Common Risk Allocation Under Traditional and P3 Procurement.

Note: NEPA = National Environmental Policy Act, QA = quality assurance, QC = quality control, O&M = operation and maintenance.

Source: Virginia DOT’s PPTA Risk Analysis Guidance, September 2011.



PROGRAM AREAS OF THE OFFICE OF INNOVATIVE PROGRAM DELIVERY

IPD provides a one-stop source for expertise, guidance, research, decision tools, and publications on program delivery innovations. Our Web page, workshops, and other resources help build the capacity of transportation professionals to deliver innovation.

PROJECT DELIVERY

IPD’s project delivery team covers cost estimate reviews, financial planning, and project management and assists FHWA Divisions with statutory requirements for major projects (e.g., cost estimate reviews, financial plans, and project management plans).

PROJECT FINANCE

IPD’s project finance program focuses on alternative financing, including State Infrastructure Banks (SIBs), Grant Anticipation Revenue Vehicles (GARVEEs), and Build America Bonds (BABs).

PUBLIC–PRIVATE PARTNERSHIPS

IPD’s P3 program covers alternative procurement and payment models (e.g., toll and availability payments), which can reduce cost, improve project quality, and provide additional financing options.

REVENUE

IPD’s revenue program focuses on how governments can use innovation to generate revenue from transportation projects (e.g., value capture, developer mitigation fees, air rights, and road pricing).

TIFIA

The Transportation Infrastructure Finance and Innovation Act (TIFIA) program provides credit assistance for significant projects. Many surface transportation projects—highway, transit, railroad, intermodal freight, and port access—are eligible to apply for assistance.



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