Defining and Mitigating the Governance Challenges of Infrastructure Project Development and Delivery

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Abstract

Prior research on the governance of large infrastructure projects has emphasized the question of who should own and operate long-lived infrastructure assets, comparing public and private organizations with respect to productive efficiency or the distribution of welfare. Our ongoing research seeks to shift the focus of this research to the question of how public or private organizations can best manage two distinct kinds of governance challenges that occur systematically during the project shaping, implementation and operation phases of such projects: (1) opportunism in the presence of displaced agency – i.e., conflicts between the incentives of parties leading decision making in each of the successive and interdependent phases of design, construction and operations that lead to sub-optimal investment and may lead them to pursue their self-interest with guile; and (2) political and regulatory risk – i.e., ex post political interventions in operational decisions. A model that incorporates the efficiency and legitimacy consequences of governance decisions over the life of an infrastructure project thus offers substantial gains on more piecemeal disciplinary approaches. We seek to develop a new typology of hybrid governance mechanisms designed to alter the incidence of opportunism by counterparties or stakeholders to a series of interconnected transactions. This paper lays out the two key governance challenges of infrastructure projects in some detail, with examples of each, and points the way toward research on a broader governance framework for such projects. Our conference presentation and future publications will focus in greater depth on examples of both existing and proposed new hybrid governance arrangements that must be studied, refined and implemented to address these challenges.

KEYWORDS: Infrastructure; governance; transaction costs; socio-political governance; displaced agency; partnering; lean construction.
Introduction
Scholars have long expressed dissatisfaction with the “sharp delineation of markets vs. hierarchies” especially in networked, project-based industries like construction (Gunnarsson & Levitt 1982; Stinchcombe 1985; Bradach and Eccles 1989:97) and have offered myriad calls to pay more attention to hybrid forms of organization in which relational contracting governed by trust complements or dominates the mechanisms of price or authority. We argue that despite a clear awareness of the importance of interpersonal or inter-organizational trust and a growing body of evidence that this trust alters transactional governance and performance, we lack a clear understanding of the mechanisms by which trust is developed and sustained in project networks.

Our ongoing research seeks to identify and offer examples of the following kinds of socio-political governance mechanisms that alter the incidence of opportunism: the cultivation of a desire for social status and avoidance of social sanction; the development and reinforcement of a common identity; the adherence to precepts of distributive or procedural justice; the adherence to participatory models of engagement; the alignment of social and interpersonal interests as well as economic interests; and the deployment of influence strategies. We develop our theoretical arguments in the context of infrastructure services, where trillions of dollars of investment are organized under conditions of extreme contractual hazards via governance mechanisms that are neither market nor hierarchy. However, we conclude by noting the broad applicability of these governance challenges and socio-political governance mechanisms.

Points of Departure
Our aim is to extend the frameworks presented by Stinchcombe (1985), Ouchi (1980) and Bradach & Eccles (1989) to encompass a broader set of socio-political governance mechanisms that can generate trust thereby allowing for a clan form of organization. Ouchi (1980:131) introduces the clan form by noting that clan forms of organization that rely on goal congruence coexist with market and bureaucratic forms of organization that use distinct mechanisms to overcome goal incongruence between principals and agents. Ouchi closes his article by identifying tradition or other means of crafting legitimate social authority, norms of reciprocity and common values and beliefs as factors associated with an increased efficacy of the clan form. He cites utopian communities, military units, high technology or medical work teams and historical employment relations between Japanese workers and business groups as examples of such contexts.

Bradach and Eccles (1989) seek to deepen the insight provided by Ouchi (1980) by focusing on the governance or control mechanisms that support these organizational forms. Instead of market,
bureaucracy and clans, their emphasis is on the distinction between price, authority and trust. They explicitly build on Zucker’s (1986) depiction of the “Production of Trust” to examine how “(a) diffuse social norms of obligation and cooperation, and (b) personal relationships that overlap with economic exchanges provide the basis for trust.” (Bradach and Eccles 1989:105). They cite an expansive body of evidence using varied methods and contexts that all highlight the power of long-term relations, in which counterparties repeatedly observe each other observing norms of fairness, to reduce the incidence of opportunistic behavior. They next survey literature demonstrating that “where economic transactions are embedded in personal relationships the hazards of opportunism are diminished and the need for elaborate formal governance structures is reduced or eliminated entirely.

Much research has built upon the foundation of these two seminal articles, but with limited emphasis on the specific governance mechanisms that change states of mind. Rather, the emphasis has been on the exploration of the question of whether trust is a substitute or a complement to more traditional forms of governance (Mayer and Argyres 2004; Poppo and Zenger 2002). Moreover the focus of virtually all this work has been on trust in bilateral relationships. In contrast, we seek to build on the path of development pursued by Bradach & Eccles (1989) in further explicating the control or governance mechanisms that generate trust to undergird problematic contracts. In the context of infrastructure projects, this process leads us to explore not only bilateral exchange relationships but the relationships between a broader network of direct and indirect stakeholders in a project-based industrial supply chain, linked by a series of temporally sequenced contracts. This dual broadening of scope —development of trust across a network vs. in a dyad, and sets of transactions that occur in an interdependent, temporally sequenced set of relationships— led us to consider a wider range of mechanisms drawing from disparate disciplines but unified in their goal of reducing the incidence of opportunism among multiple stakeholders. Before turning to the depiction of these mechanisms, we introduce the specific context in which we develop our arguments.

The Context of Infrastructure Projects

Two characteristics of infrastructure projects make them ideal for the development of a deeper understanding of socio-political governance. First, they are typically produced by multiple counterparties through a complex sequence of interlinked transactions. Second, infrastructure projects are inherently highly politically salient, both because of their catalytic role in the process of development and their centrality to a nation’s security and well-being. Given these characteristics, the governance of infrastructure projects faces an extremely high level of two related contractual hazards: (1) opportunism in the presence of displaced agency – i.e., conflicts between the incentives of parties leading decision
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making in each of the successive and interdependent phases of design, construction and operations that leads to sub-optimal investment and may lead them to pursue their self-interest with guile; and (2) political and regulatory risk – i.e., *ex post* political interventions in operational decisions.

Temporally the provision of infrastructure services typically proceeds through phases of project shaping, detailed design, construction and operation. While transactions between counterparties in each of these transactions may appear bilateral and discrete, they implicitly include counterparties to and stakeholders in the full sequence of temporally linked transactions, and thus cannot be examined in isolation from each other. So a more traditional transaction cost analysis, which would examine one discrete transaction or a series of recurring transactions of a given type in isolation, is problematic. Instead, we simultaneously analyze the series of temporally linked and bundled, distinct, sequential transactions involved in the provision of infrastructure services. The supplier and buyer in any one transaction can and do opportunistically shift the burden of costs and the distribution of benefits across the sequence of related transactions. Furthermore, they appeal to political and regulatory actors to intervene directly or at the behest of a counterparty or stakeholder in any of the related transactions (e.g., current and future end users, bearers of externalities, taxpayers, bondholders and other suppliers) in *ex post* efforts to alter the distribution of rents resulting from *ex ante* investments. We next review specific manifestations of opportunism within each phase of the lifecycle of infrastructure projects to illustrate the magnitude of the governance challenge in infrastructure services.

**Opportunism Across the Project Life-Cycle**

*Project Shaping.* In the project shaping phase, planning consultants are typically paid a fixed fee or reimbursable fee with fixed profit for their services by the project sponsors—the government agency acting as the owner-developer or the private consortium providing the equity investment and management of the project. If the projects go ahead based on planning stage estimates, these consultants are well placed to receive much larger contracts for detailed design and construction supervision on these projects, as well as future planning contracts from these and other sponsors. In the public sector, half-completed infrastructure projects become such a source of public embarrassment that governments—typically future governments—tend to find funds to complete them, blaming the cost overruns on their predecessors and taking credit for rescuing the failed projects. In the private sector, equity holders can often renegotiate terms with lenders to help them recover at least some of their potential losses from costs over-runs and demand under-runs—as was done in the case of the Channel Tunnel. So there are typically strong incentives for infrastructure planning consultants to align their behavior to serve the interests of politicized public and private sector promoters—including local governments, engineers, contractors,
construction labor unions, local chambers of commerce, etc.—tending systematically to overestimate demand and underestimate construction cost.

As a result, estimates of demand even for local public works projects in developed countries are notoriously optimistic; and estimates of construction costs tend to be even more so, resulting in “Bridges to Nowhere” that exceed their estimated costs by many times.1 The true costs for these projects are deferred to future users or taxpayers whereas the political benefit from potential future counterparties and stakeholders for their announcement is received in the present. Thus, the current principals—the local or regional development agencies or private sponsors and their agents (i.e., the planning consultants) opportunistically collude—explicitly or implicitly—to initiate the development of myriad projects whose long-run economic and political feasibility is sometimes dubious at best.

The Channel Tunnel between England and France is a good example of a common pattern in infrastructure projects. This project exceeded its cost estimate of £2.6 Billion by almost 80%; its financing costs were 140% of estimated costs; and its passenger trip demand in the first year of operation was just 18% of the forecasted demand (Flyvbjerg et al, 2003). As a result, the Channel Tunnel has gone through multiple rounds of refinancing, and is just beginning to show a profit in 2009—some 15 years after commencement of operations!

Design. Local governments, working with their design consultants during the detailed design phase then intervene to “gold plate” (i.e., overdesign) the proposed facilities in order to create even miniscule savings in operating costs that will be borne exclusively or largely by the local communities that they represent at the expense of potentially drastic increases in the up-front construction costs borne largely by grants from a regional or national infrastructure agency. For example, a study of design decision-making on a major urban transit project, found that the local transit agency sought to eliminate the operational cost of pumping water out of a tunnel by specifying that the tunnel should have zero leakage. The engineers on this project, facing liability in the event of any leakage, specified a 12-inch thick concrete lining for tunnels, far beyond what was needed for structural support, at a cost of millions of dollars per mile (Levitt et al 1980). Private design consultants, or government professional engineers have strong incentives to go along with such overdesign, and design conservatively in order to avoid

1 A large meta-study of dozens of large infrastructure projects worldwide confirmed this consistent overestimation of demand and underestimation of cost for transportation projects all around the globe by governments and their planning consultants—the “economic hit men”—over the last several decades (Flyvbjerg et al. 2003).
potential professional liability suits for failures of any kind (Levitt et al. 1980; 1984). They have few incentives to design aggressively to limit construction costs: they work on reimbursable fee contracts and any overdesign tends to be imperceptible to taxpayers within or outside the project service area.

Construction. Construction under typical firm-fixed-price or fixed unit price contracts necessarily creates an adversarial relationship between the client, often represented by the engineer as its agent, and the contractor. The contractor is incentivized by such contracts to complete the project at minimal cost while meeting —but not exceeding— the minimum design specifications. Conversely, the client and its engineer are incentivized to insure that the contractor meets or exceeds the minimum design specifications at the lowest cost to the client. Any ambiguity or discrepancy among the multiple sets of plans and specifications produced by multiple, fragmented, specialist designers creates an opportunity for honest or opportunistic “change order” negotiation by the contractor to increase payments and allowable completion time. Contractors submit "Requests for Information" (RFIs) to clarify such inconsistencies; these often escalate into "Change" requests by the contractor for extra time and money, which must be formalized by the owner through negotiated “Change Orders” to the original contract. Negotiations about the legitimacy and magnitude of change orders can then further escalate into arbitration or litigation (“Claims”) if not settled to the contractor’s satisfaction. Thus, when contractors spot inconsistencies in bidding documents, they are motivated not to raise questions about any perceived errors or omissions prior to the bid, but rather use this information to bid low, capture the project, and then seek additional compensation via change orders after work has commenced and they “discover” the discrepancies.

Operations. Whereas economic models clearly highlight the efficiency of market-based pricing for infrastructure services, the political and social sustainability of such pricing models is an open question even in countries where the sanctity of contracts is a widely supported norm. When prices or shareholder returns are perceived to be “too high” relative to ability or willingness to pay of consumers or stakeholder’s perception of “fairness” in the current economic environment, direct or indirect political pressure to renegotiate the terms of the deal is likely to follow, irrespective of the formal independence of the regulatory authority, sophistication of the contractual guarantees invoking security bonds in offshore bank accounts, contractually required arbitration under foreign law, appeal to a bilateral investment treaty or letter of comfort, or the sophistication of the financial hedges including public or private political and regulatory risk insurance.

The drivers of these perceptions are not limited to the cost of service provision, the availability of substitutes or the opportunity cost of capital. Rather, they include such peripheral factors as the degree of economic hardship born by consumers or impacted stakeholders, the nationality of the service provider,
the past price history of the service and the reputation of the government and intermediaries associated
with the design, implementation and operation of the infrastructure provider. Both sides frequently invoke
public safety, fairness, and other broadly accepted norms in these disputes, seeking to build a coalition of
political and social support for their true desired position—i.e., a greater share of the rents at the expense
of their counterparty. Given a 30-year to 50-year lifespan of infrastructure assets that typically spans
multiple changes of governments, it is simply impossible for governments to credibly commit to contracts
that remove these political elements of market risk.

An infrastructure owner’s or operator’s foreign identity can also aggravate perceptions of
unfairness or illegitimacy by local stakeholders (Gomez-Ibanez et al. 2004). Consider the case of the
water supply project in Cochabamba, Bolivia where the government granted a concession to a consortium
of foreign companies for the city’s water services. As soon as the private concessionaire began operations
in November 1999, protests arose over the project. Tariffs had increased substantially by the new
operators to cover the full capital costs of supply improvements. Additionally, the concession granted the
consortium exclusive rights to all water resources in the city. As a result, well-established alternative
water sources including privately-owned wells and storage tanks and tanker-based vendors were to be
phased out over time. After six months of road blocks, strikes, and public demonstrations, the Bolivian
government cancelled the concession contract. Nickson and Vargas (2002) suggest that, for the Bolivian
population, the project represented “a preference for foreign capital over the national interest” in a
country with “a long tradition of anti-imperialist rhetoric.” Foreign firms delivering, treating and selling
water for profit and imposing limits on groundwater pumping by local farmers flew in the face of local
cognitive-cultural institutions (Scott 2001) that “water is a basic, natural right of citizens.” This “Yanqui
Imperialist” project became a lightning rod for many other East vs. West, urban vs. rural and
European/Mestizo vs. indigenous political fault lines in Bolivia, and helped to foment the revolution that
put Evo Morales in power in 2006.

These examples of displaced agency and lack of political legitimacy show some of the unique
governance challenges for these long-lived, highly asset-specific, near-natural monopoly projects. Next,
we draw out some theoretical limitations of conventional governance approaches in addressing these
challenges.

**Limitations of Conventional Governance**

The construction management literature has followed the logic of transaction cost economics in arguing
that a typical construction project, with its delayered system architecture and fragmented supply-chain,
has some of the characteristics of both markets and hierarchies (Eccles 1981; Gunnarson and Levitt 1982).
Opportunistic behavior can, it has been argued, be mitigated in hierarchical governance structures when all of the lifecycle project costs and benefits of a project are born by a single entity—i.e. the local government agency or private entity that will design, build, operate and maintain the facility over an extended period. Alternatively, the opportunistic behavior can be mitigated through carefully specified contractual incentives with appeal to neoclassical contracting. We argue that both of these governance mechanisms are partial solutions that fail to fully address the underlying hazard of opportunistic behavior by counterparties distant to the immediate transaction. At the extreme, a reliance on hierarchical governance (typically by governments) or neoclassical contracting only shifts the burden of costs to increasingly distant and diffuse actors who lack the capacity to assess the risks they are taking on or monitor the underlying behavior of the counterparties and properly incentivize them to eschew opportunistic behavior.

*Hierarchy.* A design-build construction contractor unifies detailed design and construction services and tenders a proposal to the client to maximize the value that can be delivered for a given budget. The client then picks the design-build tender—typically from a joint venture of one or more construction firms and design firms—that appears to offer them the greatest value. In addition Design-Build contracting allows construction to begin before design is complete, with the potential to save considerable time over a more conventional, sequential Design-Bid-Build approach. However, only relatively sophisticated construction buyers can specify their requirements well enough at the conceptual design stage to pick a “Design-Build” or “Engineer, Procure and Construct” (EPC) contractor that will optimally satisfy its needs and wants for the project. As a result, this approach tends to be used for relatively well specified facilities like industrial plants, warehouses, standard office buildings, highway segments or bridges by large manufacturing services companies (e.g., Dow, DuPont, Exxon-Mobil, Bank or America, Google, Intel) or large governmental agencies (e.g., the General Services Administration in the US that purchases or leases buildings for use by most Federal agencies; state highway agencies; regional mass transit agencies; large school boards; and the like). These sophisticated construction buyers develop a series of similar facilities over time, so they can develop the in-house expertise to specify their requirements clearly and unambiguously enough to exploit this mode of contracting successfully. For other buyers, the subsequent buyer’s remorse at what they have bought, or the *ex post* renegotiation costs incurred with the Design-Build construction contractor can outweigh the savings in time and the increases in value from alleviating the agency problem between the design vs. construction actors, if acting independently.
One solution to this problem is to further extend the scope of the Design-Build construction organization both upstream and downstream so that the same entity finances, designs, builds, owns and operates the facility. This further internalization, however, can generate yet another conflict in which the ultimate costs of the project are passed onto third parties — the end users—who are unable to assess the risks that they are bearing accurately, or have no choice but to accept them. When a contractor or contractors that will design and build the project also represent part of the consortium financing the project, they have two ways to make profit: payment for their design-construction services, and income from their share of the investment returns for the operation of the facilities. The English Channel Tunnel ("Chunnel") project is an egregious example of this conflict of interest problem.

**Neoclassical Contracting.** Few if any public or private organizations are capable or willing to internalize the full set of transactions involved in infrastructure provision. Thus, some form of market exchange in which opportunistic behavior can arise seems inevitable. One means to mitigate opportunism in such transactions is through the use of external commitment or bonding mechanisms such as an appeal to the judicial system, financial guarantors such as surety bonding companies, or credible third party dispute resolution of detailed contractual commitments. While in theory, the reliance on independent and impartial third party rulings could resolve the inherent uncertainty in complex and always incomplete contingent contracts, one or both parties may face incentives to tilt the playing field in its favor by directly or indirectly stimulating political intervention in the dispute. The aim of such influence tactics is typically to avoid the uncertainty of the dispute resolution process and use political or regulatory intervention to secure a more favorable and potentially expeditious outcome. We offer three examples of such opportunistic behavior below. Note, in each case, the shift from a focus on the legal elements of a potential dispute to its perceived fairness or legitimacy.

The history of the State Route 91 (SR-91) express lanes in Orange County, California highlights the implicit hazards of trilateral governance of infrastructure projects even in countries with well developed legal systems and property rights. The bondholders of the project demanded a strong non-compete clause in the PPP contract, which blocked the California State Transportation Department (Caltrans) from making any improvements to the SR-91 free lanes that could increase their capacity, and thereby undermine the revenue received by the toll road operator. The clause was invoked when Caltrans proposed a number of improvements to the free lanes in order to "alleviate safety concerns." In response to this proposal by Caltrans, CPTC filed a lawsuit against Caltrans in March 1999, claiming that the improvements were actually disguised efforts to increase capacity and, therefore, constituted a violation of the non-compete clause. Caltrans’ actual intentions remain unclear and, in practice, it is often difficult
to separate safety improvements from capacity increases. Although Caltrans and CPTC were able to reach a settlement, the combination of the lawsuit and a steep increase in tolls for the use of the road at peak commute times led to growing protests, and the labeling of the toll lanes as the “Lexus lanes”. There were also allegations at the time that CPTC had filed the lawsuit in order to win the approval of Caltrans for a sale of the express lanes, which were performing relatively poorly as an investment. The rigid PPP agreement had failed to provide a means to renegotiate terms of the partnership as traffic conditions evolved.

A more extreme case of the limits of external contractual support can be found in the case of independent power projects in Southeast Asia, where many governments wooing private power investors in the early and mid-1990s offered contracts that insulated investors from commercial risk, fuel supply risk, exchange rate risk, currency conversion risk, regulatory risk and the risk of political force majeur. When the East Asian financial crisis occurred in 1997, it brought private power investors’ favorable treatment into sharp relief as currency values, share prices and electricity demand all plummeted. The obligations that the governments of the struggling countries had previously undertaken to attract private investors now had little apparent benefit, and political officials were left in the tenuous position of having to choose between honoring the contracts, at the risk of compromising their own popular support, or renegotiating contracts in order to maintain support. Despite the comprehensive set of covered risks it became increasingly clear that, in the words of one interviewee, “the government has the ability to make us healthy or unhealthy. It’s a government decision.” In September 1998, President Habibe announced his intention to eliminate 13 of the 26 IPP contracts “without significant compensation” and six more “with some compensation.” (Henisz and Zelner 2005a)

Discussion

The examples described above illustrate a series of severe and recurring challenges to traditional forms of project governance for infrastructure development and delivery projects, arising from several underlying attributes of these projects and the industry that develops and delivers infrastructure assets. Displaced agency problems arise from the cycling in and out across successive project phases of the “project” of multiple supply chain participants playing different roles, and whose interests can be in direct conflict both within a project phase and across project phases. The broad scope of the potential counterparties makes it extremely difficult to balance interests even at a single point in time; and it makes it especially difficult to continually realign contractual terms to sustain the balance of interests among parties over the decades-long lifecycle of such projects as global, regional and local technologies, economies and politics change in important ways. Finally, the strategic impact of large infrastructure assets on communities and
whole countries invokes the intervening or moderating presence of governments in infrastructure disputes such as those described above. This always present specter of governmental intervention—even in liberal market economies like the US—overwhelms the power of contracts, whether backed by domestic courts or international arbitration and dispute resolution even of the most sophisticated kind, when individuals or groups can choose to appeal to political rather than legal resolution of perceived imbalances in costs and benefits that may arise over time. Clearly a richer set of mechanisms than contracts and hierarchical fiat is needed to make such projects predictably governable.

Investors and host governments grappling with the risks posed by such significant socio-political governance challenges need to respond in kind. They need to complement legal, financial and organizational mechanisms of governance with broader socio-political governance instruments. These instruments can facilitate adaptation not only by explicit economic counterparties but also by implicit economic, political and social counterparties. In addition to the power of legal fiat enjoyed by hierarchy and the economic incentives enjoyed by market, we seek to draw attention to the power of social ties and common identity in shaping the behavior of all parties in a manner that highlights collective interest, develops real trust and attenuates opportunistic behavior, without incurring the administrative costs and lost incentive intensity of full-scale vertical integration or the high transaction costs and ultimate failure of complex contingent contracts with cross-national trilateral governance.

**Toward Socio-Political Governance**

Our ongoing research will draw upon complementary insights from multiple disciplines in the development of enhanced governance frameworks. Future publications will present ideas from: social exchange theory, which shares our focus on the relationship versus the transaction as the unit of analysis; and social control and sanctioning mechanisms, such as the construction of a collective identity (Dutton et al. 1994), restricted access to outsiders, socialization, sanctions and reputation (Jones et al. 1997), norms of reciprocity (Adams 1965; Gouldner 1960), and adherence to principles of distributive justice (Blau 1964; Homans 1958) and procedural justice (Lind and Tyler 1988; Thibaut and Walker 1975).

Our conference presentation will describe the use of cooperatives to govern the operation of clean water distribution infrastructure—historically one of the most challenging of all infrastructure sectors to govern both efficiently and sustainably—as an example of a hybrid market, hierarchy and socio-political governance framework that has recently experienced considerable success in the face of failures like the one described in Cochabamba, Bolivia of traditional approaches, including Private-Public Partnership (PPP) governance approaches, for this sector.
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