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Toward an Integrated Lifecycle Governance Framework for Delivering Civil Infrastructure Projects through Public-Private Partnerships (P3s)

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**TOWARD AN INTEGRATED LIFECYCLE GOVERNANCE FRAMEWORK
FOR DELIVERING CIVIL INFRASTRUCTURE PROJECTS
THROUGH PUBLIC-PRIVATE PARTNERSHIPS (P3S)**

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ABSTRACT

The quality of civil infrastructure is widely accepted to be a determinant of public health and the vitality of economies. However, governments of emerging market countries face enormous financial, fiscal and capacity challenges in delivering sorely needed new infrastructure for their growing and rapidly urbanizing populations. At the same time, financially and fiscally strapped governments of mature market economies are struggling to upgrade and retrofit their aging and obsolete infrastructure. Economies at both ends of the development spectrum need more robust project governance that can enable new forms of finance to accelerate and enhance the development of critical infrastructure. Over the past two decades, governments worldwide have experimented with differing approaches for awarding long term (25-99 year) concessions, called “Public-Private Partnerships (P3s),” to finance, design, build and operate individual infrastructure assets previously financed and operated by governments.

This conference paper lays out the problem of long term relational contracting in the infrastructure P3 domain, describes the intellectual challenges in developing an integrated theory that can address it, presents key points of departure from multiple disciplines that have previously been fragmented in their views of relational contracting, and a lays out a research strategy for developing an integrated theoretical framework to capture the complexity of P3 infrastructure projects over their lifecycles.

The research described in this paper is in its infancy, so we have very few findings to report at this time. This conference paper is intended to provide an overview of the theoretical challenges and a review of relevant literature to inform other researchers working on aspects of this problem, and to propose a research approach that can lead to more integrated and coherent theoretical frameworks for understanding and enhancing the governance of P3 infrastructure projects. Our oral presentation at the conference will present preliminary findings from our roundtables and interviews conducted to date. A companion paper by South *et al* in this conference, presents more detail about the stakeholder engagement phase of this research, which is more mature.

KEYWORDS: Relational Contracting; Theory-Building; Public-Private Partnership (P3); Governance; Stakeholder Management; Project Organization; Real Options; Broken Agency.

INTRODUCTION

The quality of civil infrastructure (including roads, railroads, ports, airports, power, telecommunications, water supply and solid waste treatment) is widely accepted to be a determinant of public health and the vitality of economies. However, governments of emerging market countries face enormous financial, fiscal and capacity challenges in delivering sorely needed new infrastructure for their growing and rapidly urbanizing populations. At the same time, financially and fiscally strapped governments of mature market economies are struggling to upgrade and retrofit their aging and obsolete infrastructure. **Economies at both ends of the development spectrum need more robust project governance that can enable new forms of finance to accelerate and enhance the development of critical infrastructure.**

Ironically, institutional investors such as pension funds, sovereign wealth funds, endowments and family offices control up to one third of all investable capital worldwide (World Economic Forum, 2011). In the current financial environment these funds struggle to meet their sponsors' imposed return targets, relegated to low yield fixed income securities, but show great interest in the few infrastructure assets that occasionally come to market. The large scale of such projects make them transactionally efficient investment opportunities for these funds, and the long-term, inflation-adjusted cash flows, along with their moderate risk-reward profiles, make them an attractive asset to add to their investment portfolios. In short, **institutional investors would like to fund the development of critical infrastructure**, but seldom do because of a lack of suitable governance arrangements. Further, numerous **infrastructure developers are poised to inject equity capital** into infrastructure projects.

During the 1900s, most U.S. civil infrastructure elements were viewed as being “natural monopolies.” Hence, they were primarily financed by governments, paid for by taxes and operated with partial or total subsidies to end-users. Over the past two decades, governments worldwide have experimented with differing approaches for awarding long term (25-99 year) concessions, called “Public-Private Partnerships (P3s),” oftentimes utilizing “Special Purpose Vehicles (SPVs)” —project companies set up by consortia of private firms to raise structured finance in order to finance, design, build and operate individual infrastructure assets previously financed and operated by governments. P3s, including the UK's policy for Private Finance Initiatives (PFI), have frequently enabled critically needed infrastructure projects to proceed and begin delivering services to the public years ahead of traditional government delivery means; and they have spread global best practices, both in technology and in operational processes, around the world, raising efficiency and quality (Levy, 2011; U.S. DOT, 2004).

Given P3s potential for sustainable economic growth, why would national and subnational governments not avail themselves of this vast source of developer expertise and private capital to develop sorely needed infrastructure? The answer: *Governance of P3 concession arrangements has had mixed success.*

This conference paper lays out the problem of long term relational contracting in the Infrastructure P3 domain, describes the intellectual challenges in developing an integrated theory that can address it, presents key points of departure from multiple disciplines that have previously been fragmented in their views of relational contracting, and a lays out a research strategy for developing an integrated theoretical framework to capture the complexity of P3 infrastructure projects over their lifecycles. The project described in this paper is in its infancy, so we have very few findings to report at this time. The paper is intended to provide a review of relevant literature to inform other researchers working on aspects of this problem and to suggest research approaches that can lead to more integrated and coherent theoretical frameworks for

understanding and enhancing the governance of privately financed and operated infrastructure projects. Our oral presentation at the conference will present preliminary findings from our roundtables and interviews conducted to date. A companion paper by South *et al* in this conference, presents more detail about the stakeholder engagement phase of this research, which is more mature.

The Practical Challenges of P3 Governance: Extreme Relational Contracting

P3s are typically one-off, long-lived, uncertain, highly asset-specific, multiphase transactions, surrounded by a multitude of internal and external stakeholders in changing contexts. Such projects raise fearsome long-term governance challenges that are not adequately informed by existing, fragmented theories about project governance. As a result, global experience in the use of private concessions to deliver and operate infrastructure has been mixed. Governance failures in the delivery and operation of infrastructure P3s have given rise to deeply entrenched opponents of P3s—ranging from public sector unions to providers of public bond finance. These opponents use past governance failures as ammunition to oppose P3s across the board and to block them completely in many cases (Jooste et al., 2011).

A serious undersupply of infrastructure in emerging market countries propagates disastrous public health and economic consequences. Similarly, an aging, crumbling and obsolete infrastructure base in mature market economies is retarding economic productivity and threatening citizens' public health and safety (e.g. interstate highway bridges collapse in Minnesota, dikes and levees fail in Missouri and Louisiana). A global infrastructure deficit, coupled with the potential to unlock new sustainable forms of infrastructure finance, motivates the need to address the complex governance challenge of 'extreme relational contracting' inherent in the lifecycle of P3 projects.

The Theoretical Challenge: Disciplinary Fragmentation

Governance of long-term contracts has been the subject of study in a variety of fields, ranging from economics, law, sociology, political science, psychology, general management and project management. Extant governance theories in these fields can provide useful insights for simpler, less uncertain and shorter-lived contracts, but fall far short of providing the insights needed to structure the enabling legislation, contracts, leadership and management practices, and work processes well enough to make these critically important P3s sustain and thrive. There have been some prior efforts to bridge across disciplines to develop more holistic theories of governance that could inform these cross-sectoral, long-lived projects and their supply chain networks, e.g. (DiMaggio, 2003; Gereffi & Korzeniewicz, 1994; Granovetter, 1985; Grout & Stevens, 2003; Powell, 1990; Stinchcombe, 1990). However, more unified governance frameworks barely begin to address the full scope and scale of the governance challenges associated with P3 delivery of infrastructure projects. The theoretical 'next step' in advancing a theory for relational governance necessarily includes an extension of past efforts by drawing from an expanded set of multidisciplinary concepts (see Figure 1), which are present in modern P3 projects.

The Methodological Challenge

P3 projects involve multiple and diverse interests and players, changing over time, whose efforts are interdependent over long periods of time. The internal governance of infrastructure projects is challenging to study because infrastructure P3 projects are hybrid forms: part long-lived, multiphase, highly asset-specific and uncertain market transactions; and part short-lived, quasi-hierarchical networks, incorporating private and public entities. Understanding their governance

thus requires integrating methods used by institutional economists and organization theorists together with ideas about identity and motivation from psychology. Such projects are also highly political and hence require political legitimacy to be sustainable. Legitimacy is found in the perceptions of various actors, which necessitates an understanding of the networks of stakeholders whose support is required for projects to be successful. This entails research techniques like social network analysis and stakeholder field analysis.

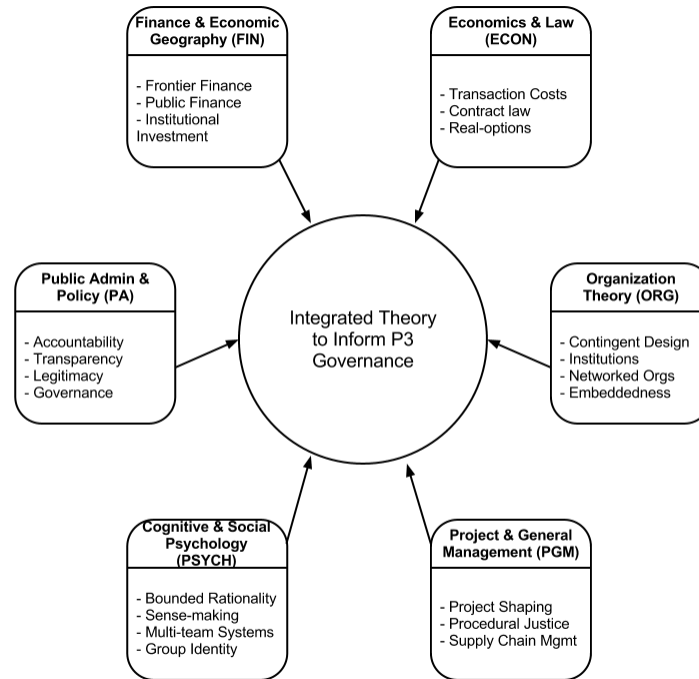


Figure 1: Disciplinary fields of study and respective concepts necessary for building an integrated theory to inform P3 project lifecycle governance

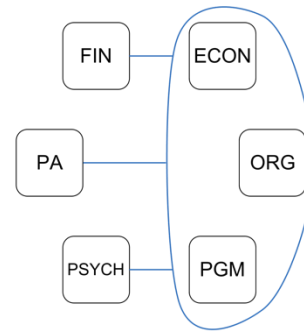
RESEARCH QUESTIONS AND POINTS OF DEPARTURE

Our collaborative research aims to integrate and extend a currently fragmented body of theory to describe, predict—and, ultimately, design new approaches for addressing—the extreme governance challenges of one-off, long-lived, uncertain, highly asset-specific, multiphase civil infrastructure projects. This research will be grounded in case studies of some of the most challenging of such projects—highway infrastructure projects that are financed, developed and operated through 25 to 50-year P3 concession agreements. To accomplish the task, this project departs from a foundation of three nearly decomposable components of the problem, termed “research thrusts.” Each research thrust draws from two or more of the disciplinary constructs laid out in Fig. 1. We argue that the interrelated nature of each thrust influences the others, and therefore, they must be understood together. Nevertheless, partial parsing of the overarching challenge into three substantive thrusts allows for a degree of research clarity and focus in what would otherwise be an overwhelmingly complex study. Therefore, parallel research within each thrust, along with periodic coordination across thrusts allows simultaneous discovery to inform

our understanding across the research project. Each thrust begins with a central research question.

Q1: What combinations of contractual, organizational and social governance mechanisms can best promote cooperative behavior and mitigate opportunism in P3 infrastructure projects?

It has long been established that construction projects should neither be viewed as pure market nor pure hierarchy, but rather viewed as a project supply chain—networks that have elements of each (Dioguardi, 1983; Eccles, 1981; Granovetter, 1985; Gunnarson & Levitt, 1982; Powell, 1990; Stinchcombe, 1990), and must be designed with this in mind. Moreover, large, global, cross-sectoral, multi-phased civil infrastructure projects tend to be one-off projects for which transactions have no strong “shadow of the future,” but where elements of relational contracting are still ubiquitous (Henisz et al., 2012).



Organizational sociologists, from Lawrence and Lorsch (1967) to Galbraith (1977), Mintzberg (1993) and (Burton et al., 2006), have developed a contingent, information processing approach for designing organizations, in which requisite information processing capacity for supervision and coordination must be provided in each part of the organization to address the technical complexity, interdependency and uncertainty associated with the multiple tasks carried out by specialist subteams. This branch of organization theory provides insights about spans of control, levels of centralization, formalization, matrix strength, required media richness for communication, and other dimensions of structure related to the allocation and exercise of authority and responsibility for decision-making.

Building on Galbraith (1974) and Burton et al. (2006), and the synthesis of contingency theory, one of the PIs in this project developed the Virtual Design Team (VDT), a computational modeling and simulation framework to model, analyze and optimize the organizational structures and staffing for such projects (Levitt, 2012; Levitt et al., 1999). For fast-paced, complex, but relatively routine engineering projects, VDT models and simulates project organizations, executing complex workflows to provide insights about likely information overload in specific parts of the organization, and it provides ways to iterate through alternative structures to find interventions that can mitigate these risks. However, the VDT framework accounts only for bounded rationality in the face of technical complexity, interdependence and uncertainty; it does not account for disparate and changing players, nor for disparate interests, asymmetric information, opportunistic behavior and public legitimacy concerns.

A large body of literature on the governance of difficult transactions exists in the transaction cost economics (TCE) literature. In his classic paper, Williamson (1979) argues that one-off projects like P3s, with their high levels of uncertainty and asset-specificity, should have unified governance—i.e., they should be performed entirely by either the cognizant government agencies or private contractors. In practice neither of these options is feasible. Governments often lack best in class—or any—capacity to carry out many key project functions. And few would suggest that private sector firms should be the parties to make politically sensitive portfolio decisions about which public infrastructure projects to develop, how much to charge infrastructure users, or what levels of safety to require. Thus some allocation of responsibilities

between the public and private sectors in planning, financing, designing, building, operating and regulating infrastructure projects is necessary. This raises the challenge of governing project networks that include public and private sector participants, with their disparate goals and organizational cultures and continual opportunities for opportunistic behavior to achieve political or financial ends, respectively. Economists such as (Williamson, 1975) have alluded to the importance of the “atmosphere” of the contract, i.e. beliefs and attitudinal considerations of both contractual parties, but view this as of minor importance to the success of the transaction. Social psychologists, on the other hand, focus on inter- and intra-personal mechanisms as persuasion and social influence, and they seek to foster trust for successful relationships (Jehn et al., 2008; Levine & Moreland, 1990).

Moreover, infrastructure P3 projects evolve through discrete project phases—**shaping** (to seek political, financial and technical feasibility), **conceptual design, detailed design, construction, early operations, ongoing operations / maintenance;** and **renovation / replacement** (Miller & Olleros, 2000). Each of these phases can be viewed as one of a series of discrete transactions, in between which key participants and stakeholders rotate in and out of the project (Ibrahim, 2005). This discontinuity of participation across phases in the project’s lifecycle creates a previously unexplored contractual hazard of “**displaced agency**—i.e., the cumulative costs that can accrue to the participants in a series of interdependent transactions as a result of counterparties’ incentives to shift costs or responsibilities to one or more counterparties not represented in the current transaction” (Henisz et al., 2012; Levitt & Sheffer, 2011) This governance challenge is not addressed by TCE.

Scott (2008) asserts that social behavior is regulated by “three institutional pillars”—legal-regulative, normative and cognitive-cultural. These three pillars of institutions collectively induce “appropriate” behavior in social groups by punishing deviance via police power, social sanctions and cognitive dissonance, respectively. Our goal is to develop a unified theoretical framework of relational governance that attempts to elaborate each of these institutional pillars and their interaction in the context of P3 infrastructure projects. Building on these powerful, but fragmented, points of departure in economics, organization theory, social psychology and project management, but recognizing the limits of each of these bodies of knowledge in addressing this particularly challenging governance problem, the first thrust of our proposed research will attempt to use insights from a set of in-depth case studies of infrastructure projects in the planning, design, construction and early operations phases to draw links between these fragmented bodies of theory to develop a more holistic framework for analyzing and designing coherent, multi-pronged governance configurations that can address the extreme governance challenges of civil infrastructure projects.

First, we focus on the formal organization as a legal-regulative institutional element, although the formal organization structure is difficult to pin down in the case of large infrastructure projects. As noted previously major construction projects are a hybrid form of organization involving both markets and hierarchy (Gunnarson & Levitt, 1982; Stinchcombe, 1990), and have embraced the value of social and inter-organizational network analysis to enhance understanding of project governance (Chinowsky & Taylor, 2012). However work to date in this field has not yet begun to integrate concepts from TCE, organization theory and social psychology into a more unified theory of governance.

Several authors have written empirically about the value of developing social exchange and trust in project teams to mitigate the rampant opportunities for opportunism that arise in such projects (Angola LNG, 2006; Bailey et al., 2007; Bayliss et al., 2004; Chan et al., 2004; Crowley

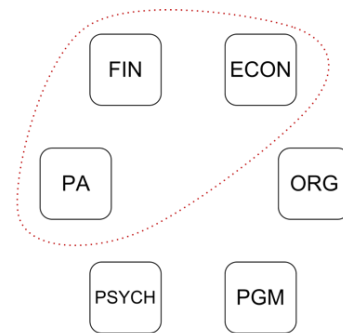
& Karim, 1995; Gil, 2009; Gransberg et al., 1999; Groat, 2004, 2006; Gross, 2007; Khanzode et al., 2008; Krick et al., 2005; Latham, 1994; Sarkar et al., 1998; Weston & Gibson, 1993). They have argued for the value of pre-project trust building exercises such as “ropes courses”; co-location of multiple disciplines in Big Rooms using shared digital building information models to achieve technical integration, and the like (Khanzode et al., 2008). In the last few years, clients from major civil infrastructure projects such as Heathrow Terminal 5 and social infrastructure projects such as Sutter Health hospitals in the US have experimented with new delivery approaches termed “Integrated Project Delivery” (IPD), in which attempts have been made to align contractual incentives, eliminate cross liability, invest in team building exercises, co-locate multiple disciplines in shared workspaces, and employ lean management techniques. These experiments are beginning to be empirically documented (Davies et al., 2009; Gil, 2009), but an integrated theoretical explanation of these mechanisms and their outcomes remains to be developed.

Other authors e.g. (Collins & Porras, 2005) have written about the importance of creating exciting visions for companies to provide intrinsic motivation for their employees. This holds true for large complex projects, especially ones involving participants from multiple private firms and public agencies (Borcherding et al., 1980). The development by project leaders of exciting vision statements, the use of project logos, project logo clothing, project (rather than corporate) paychecks, project (versus corporate) e-mail accounts and other mechanisms have been proposed as ways to create a sense of individual identity with the project and shared group identity with other project participants.

In sum, the ownership and governance arrangements for P3s must balance the motivation, expertise and efficiency of world-class private firms with the need for governmental transparency, accountability and fairness to sustain their political legitimacy. A growing literature in the public administration field addresses this issue, see e.g. (Brunner, 2010; Salamon, 2002; Shaoul et al., 2010), and provides valuable points of departure for this phase of the research.

Q2: How can we design contractual provisions that enhance the financeability of P3 transactions through mechanisms such as real options while: (a) sustaining institutional investor confidence and (b) upholding public stakeholder interests?

The factors driving the consideration and implementation of P3s are many; three central drivers, though, are often noted: (1) the fiscal and financial constraints that governments worldwide continue to face, (2) the risk management and project efficiencies that the private sector can provide, and (3) the equity and debt sources that are not only available, but eager, to invest in infrastructure assets. Unless government budgetary challenges cease, the inadequacy of funds for discretionary spending on items such as infrastructure will perpetuate. This circumstance, in particular, sets the stage for alternative means of acquiring infrastructure investment and services: project finance.



Project finance is quite sensible for large, real assets where project sponsors can transfer risks to debt holders and contractors who can bear the risks at a lower cost or manage specific activities more efficiently. In short, project finance, with its highly integrated organizational,

financial, and contractual features, “generates a low-cost financing vehicle for sponsoring firms and creates an effective governance structure for certain assets” (Esty, 2004). Moreover, project financed infrastructure assets can provide investors reasonable returns, moderate risks, and long-term, inflation adjusted cash flows, and these features match the needs of institutional investors, in particular those of pension funds and sovereign wealth funds. As such, the community of institutional investors offers a natural source of financing for infrastructure.

Yet, the long time horizon of P3s and the proclivity of some P3 equity sponsors to subcontract design, construction or operations services to other divisions within their parent organizations can create principal-agent problems for investors. For example, a sponsor and a subcontractor from the same parent organization have two differing ways to profit – their returns on equity and their fees for services – creating potential conflicts of interest (Henisz et al., 2012). While a long-term contract seems the natural mechanism to manage the agency costs of a P3, economic and public administration theorists, as noted previously, have criticized contractual frameworks as a means of governing relationships over long time horizons. The former view contracts as being inherently incomplete and blunt, while the latter emphasize the barriers that contracts create for political oversight and influence.

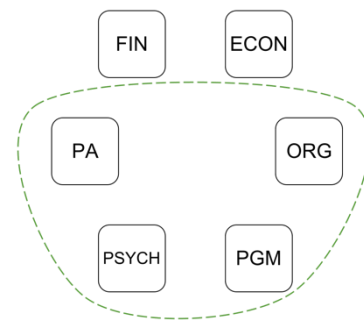
We recognize that complexity, interdependency, and uncertainty are challenges in P3 arrangements that may result in investor apprehension, opportunistic behavior, discriminatory changes, transparency and accountability breakdowns, and socio-political opposition. In many circumstances, such issues cause a P3 to “fail” since one or more of the many stakeholder groups involved are adversely affected. Oftentimes, these issues are the result of what Miller and Floricel (2000) deem “turbulence” - a surprise to project sponsors or decision-makers that introduces discontinuities that are “deeply felt differences between the future as it was imagined and the present reality.” For instance, the sponsors of the Dulles Greenway, Virginia’s first contemporary P3-type arrangement, planned for over 30,000 vehicles per day but just over 10,000 vehicles per day materialized. Despite managerial action to adjust toll rates, the original sponsors ultimately had to restructure the debt, and all equity invested was lost.

Certainly, this type of uncertainty in projects has attracted enormous academic attention. Not surprisingly, flexibility as a mechanism to cope with uncertainty is a common theme among academic researchers. As noted previously, Miller and Olleros (2000) suggested following a project shaping strategy via the creation and exercise of real options to generate flexibility. Indeed, many real option theorists have suggested adopting this framework when considering real asset investments (Amram & Kulatilaka, 2012; Copeland & Antikarov, 2001; Dixit & Pindyck, 2008; Trigeorgis, 1996). More recently, theorists such as De Neufville and Scholtes (2011) have distinguished real options into two classes: those “on” projects and those “in” projects. The difference between the two is the first concerns investment decisions whereas the second focuses on the design of flexible systems (Garvin & Ford, 2012). The shaping options described by Miller and Olleros are “in” project options since they in essence are deliberately designed by a project’s sponsors in conjunction with its key stakeholders. Quiggin (2005) suggested that the simplest way to do so is to introduce systematic flexibility into P3s as a series of puts and calls exercisable at intervals of roughly five years, where the public and private sectors have the right to exercise their respective option. Several researchers have examined very specific types of options in P3s, with most focused on revenue risk (Brandao & Saraiva, 2008; Chiara et al., 2007; Garvin & Cheah, 2004; Mattar & Cheah, 2006; Vassallo & Soliño, 2006).

Hence, the contractual challenge in P3s is uncovering mechanisms that can – to the extent possible – cope with the uncertainties and interdependencies in these arrangements, thereby increasing both investor and public sector confidence. In doing so, this thrust will identify actionable methods for structuring contracts that enable SPV formation and adaption but in a manner that enhances accountability and provides for public sector oversight. Despite the well-known limitations of long-term contracts, the literature is short on meaningful suggestions. Consequently, this thrust will take us beyond the common economic refrain to enlarge the shadow of the future and the often heard public administration calls to avoid long-term contractual engagements altogether (Froud, 2003).

Q3: How can we design and manage a dynamic project network to better align individual and corporate stakeholders’ goals with project goals?

The promise of P3s as an alternative project delivery system, which optimizes the advantages of public and private competencies, has necessarily led to questions surrounding the problem of fully integrating such a complex process. This thrust of the research project addresses this problem by exploring how social networks and external stakeholder engagement affect project outcomes. The first thrust of the research focuses on team identity and internal project governance; this third thrust studies how relationships with external stakeholders impact project outcomes.



The network of external stakeholders may substantially alter the P3 directly by, for instance, lawsuits or opposition to paying tolls, or indirectly, by influencing public requirements or changing legislation. Therefore, there is a strong need for research focusing on the complex interplay between the P3 and its network; in the words of Kivleniece and Quelin (2012), more attention is required on the “firm-public actor-activist’ value tensions.

Developing a cooperative atmosphere with external stakeholders will reduce the number of conflicts and opportunistic behavior and hence avoid important delays, e.g. lawsuits and political fights. Despite transaction cost theories’ acknowledgement of the role “atmosphere” plays in the success of the contract performance (Williamson, 1975), micro-economists pay little attention to the impact of the external stakeholders on project success. The importance of engaging external stakeholders, however, has been acknowledged widely in literature on organizational economics, and, more specifically, in studies on the impact of social responsibility on the supply and price of production. Corporate social responsibility, it is argued, contributes to reputational capital that insulates private organizations from future negative consequences in the event of future adverse shocks (Henisz et al., 2012). Moreover, Greenwood (2007) asserts that corporations should engage stakeholders to ensure that the outcomes of corporate actions benefit all key stakeholders to the maximum possible extent.

The role of stakeholder engagement in project settings is less well studied despite worldwide examples of the huge impact external groups like, for instance, environmental groups and trade unions, have on the performance of long-term project collaborations. Only recently are management journals (including AMR and AMJ) emphasizing the direct tensions external stakeholders have with public and private interactions. Kivleniece and Quelin (2012), for instance, state that external pressures and social concerns and, correspondingly, perceived legitimacy and acceptability, may significantly threaten the overall balance of gains and benefits

from the collaboration between public and private parties. Pache and Santos (2012) studied strategies P3s may adopt for project legitimacy in order to avoid long-term negotiation and conflicts. The influential role of external stakeholders is also acknowledged in evaluation studies on P3 in infrastructure. Several authors, including (Zhang & Kumaraswamy, 2001) and Yescombe (2007), indicate that successful P3 projects need a constructive external network and argue that P3 program success depends on the presence of a favorable environment for private providers of infrastructure. Mahalingam and Delhi (2012) found that a stable political environment is needed for successful implementation of P3s. Aziz (2007) stressed the importance of public capacity building to ensure P3 success. These findings are in congruence with institutional theory, which analyzes how frameworks, that include procedures, rules, schemas, and routines, become established as guiding principles for moderating organizational and social behavior (Scott, 2013, in press). Institutional theorists posit that organizations strive not only to be economically viable, but also to achieve a measure of acceptability or legitimacy within this environment by conforming to institutional forces (DiMaggio & Powell, 1983; Meyer & Rowan, 1977; Scott, 2008). Institutional theory, however, does not address how the external stakeholder network can be governed.

Social network theory provides a useful lens to study public-private-network relationships by focusing on shared contexts, beliefs, and values of the various stakeholders in the network. Borgatti et al. (2009) claim that understanding social networks provides an answer for social order and how “autonomous individuals can combine to create enduring, functioning societies”. We make the lesser claim that understanding social networks of external and internal stakeholders involved with P3 projects is necessary to develop enduring P3 project networks.

P3s are embedded in a complex and dynamic network of interrelated and heterogeneous stakeholders, and this network evolves continuously because of the 25 to 50 year duration of P3s. Besides the fact that major infrastructure projects have an exceptionally long “shaping phase” (Miller & Olleros, 2000) most P3s have an operational contract phase of more than 30 years. And, because of the problem of displaced agency, stakeholders engaged in design and development of a project may be incentivized to pass costs on to the operation phases of a project (Henisz et al., 2012). For example, a community redevelopment or historical preservation group may be more interested in aspects of overall project design and fitness with physical surroundings than with operators’ maintenance efforts later in the infrastructure assets lifecycle. Conversely, passive property owners and residents adjacent to a toll road may not internalize real impacts to their lifestyle until the project has been completed and tolling, traffic noise and other impacts of the project begin to directly affect them. These types of examples motivate questions as to which stakeholders should be engaged and actively managed at what points in time. Furthermore, stakeholders and stakeholder agents frequently cycle in and out of projects, prompting questions such as: How well do engagement techniques developed for a specific group of stakeholders persist through time as different actors leave or are inserted into a project? How can flexible governance continuously monitor the efficacy of engagement mechanisms and adapt them to dynamic project network structures?

This thrust of the research will build on institutional theory and social network theory. The aim of this thrust is to understand the role of stakeholder engagement in P3 projects and to explore how network governance mechanisms can be used for long-term P3 contracts.

RESEARCH APPROACH

The role of hybrid organizations, and P3s in particular, for the delivery of large infrastructure has been acknowledged by many leading scholars and has been the subject of study in various disciplines (Henisz et al., 2012), but there is still little understanding of the mechanisms that lead to the success of P3 projects. We aim to generate an initial cut at a coherent and integrated theoretical framework for understanding the complex management of large-scale engineering projects by combining different insights from a variety of disciplines. This framework can serve as a skeleton to guide future research in this area, and it can foster and increase the usefulness of our research results for practice. Understanding the interactions of the various mechanisms and their impact on the emergence of the project can only be understood while studying projects over time. Since P3 projects have an average time horizon of 30 years, a true longitudinal study is not possible. To study the dynamic temporal interaction of the various mechanisms in P3 projects in a three-year research project, we have chosen a *quasi-longitudinal* research approach. Here we achieve insights into the sequence of events and the mechanisms that lead to these events by adjusting for time in three ways. First, we study multiple P3 cases at different project phases. Second, each stage will be studied in depth over the time frame of one year. While this does not capture the full length of the project, it provides a window for researchers to see tendencies of change, which can be compared to the observations from projects at other stages. Third, events will also be analysed based on secondary data (formal reports, contracts, notes, media coverage, etc.) and retrospective interviews.

To generate a common understanding between the various researchers and sub-teams, we adapt the concept of “project overlay” for structuring our research approach (Barley, 1996). Team members will meet regularly to discuss findings in order to develop a cross-disciplinary understanding. We will invite practitioners to review and discuss our results in three annual roundtables to reflect on and help interpret the interim findings. This will also maximize the validity and usefulness of results. The interaction of three researcher sub-teams (arranged according to the project’s three research thrusts), each containing members with different knowledge and perspectives, will stimulate and help each other stretch their knowledge for the purpose of bridging and connecting different disciplines (Nooteboom et al., 2007). The approach we take draws on concepts such as ‘Mode 2 knowledge’ (Gibbons, 2000; Scott et al., 1994), post-modern science (Funtowicz & Ravetz, 1993), and ‘engaged scholarship’ (van de Ven, 2007). These writers have stressed the importance of multidisciplinary research and the involvement of actors outside the research community to increase the usefulness of research (Hegger et al., 2012; Hessels & Van Lente, 2008). These concepts aim at relocating dispersed activities of discovery and understanding, connection and integration, application and change from institutionally isolated disciplines to arenas of participatory actions (Boyer, 1997)

We address the complexity and contextual embeddedness of socio-technical problems by locating research activities in the communities that both support and are to benefit from the research (Bresnen, 2009; Green et al., 2009; Pettigrew, 2011; van Marrewijk et al., 2010). We will work on real life cases. Our research is both theory and practice driven. We follow van de Ven by stating that problem-driven and theory-driven research are inextricably connected, or in the words of (Weick, 1992), ‘theories have problems just as problems have theories’. It thus seems essential to allow for permeation of academia and practice by creating an environment of mutual learning. Engaging practitioners in dialogue is a suitable way for academics to

understand the underlying values of an organization and, by doing so, to become a change reflector and co-owner of managerial problems (van Marrewijk et al., 2010).

We stress that, while this research is in fact focused on theory development, we begin from existing theories and constructs as outlined above. The project is not ‘grounded theory’ in the sense that we seek the discovery of completely new theory. We appreciate the inductive aspects of this project, and note the iterative process between theory development and data collection. We believe that this “abductive approach” (Dubois & Gadde, 2002) offers the greatest promise for the development of powerful new theory in this domain.

General Methodology

Understanding the complex processes of P3s defined above requires knowledge of project objectives, contractual arrangements, legislative constraints, and legal frameworks, multiple types of formal and informal relationships between various actors, multiple layers of financial analysis, individual and organizational goals and perspectives of project stakeholders, and a host of environmental conditions and contextual factors. To gain the understanding necessary, we begin with a selection of comparative case studies of highway P3s in the United States, funded in whole or in part through private finance. Case study research is an effective way to begin building theory by focusing on the dynamic nature of specific settings (Eisenhardt, 1989). Previous studies of transportation P3s have shown case study approaches to be a fruitful method of research (Grimsey & Lewis, 2007; Monk et al., 2012). We wish to maximize the advantages of depth and strong conceptual validity (Flyvbjerg, 2011) as we seek to understand the processes and contexts of P3s.

We limit our analysis of P3s to highway projects for three reasons. First, highway projects naturally affect a large number of potential stakeholders. This is due to expropriation of private lands, potential tolling operations, the multiple public departments involved with planning, engineering, and permitting, environmental impacts of such projects, and many others. Developing a theory of relational governance for these extremely challenging projects will make the application of study findings more relevant and externally valid, particularly for less complex P3 projects. Second, the US experience with modern P3s is approximately 20 years old, providing a sufficient time horizon over which to study the dynamic nature of these projects. Third, institutional investors have historically shown specific interest in highway projects, suggesting that the study of these projects will provide greater insights into necessary conditions for involving such funds, and allow researchers to draw stronger conclusions toward the motivation of this research—developing linkages between public agencies’ need for new finance mechanisms and the potential to unlock vast institutional capital pools for critical infrastructure.

The first phase of this study will be the development of summary level case reports for each of the cases in our population—US highway P3s with a component of private finance. Since 1993, there have been 16 such projects either completed (in operation) or are currently under construction as depicted in Table 1; many of the public and private entities that have committed to support this project (see support letters) are or were involved in these projects.

A multiple case study approach will be used with each project representing a specific case, or a *bounded system* (Creswell, 2006; Stake, 1995)). By analyzing individual cases we undertake an *explanatory* approach, with *replication logic* across cases (Yin, 1981, 2008). Initial case analysis will allow each of the research sub-teams to identify ‘starting principles’ underpinning their respective research thrusts, including governance processes and critical mechanisms. Also during the first year, as initial case studies are researched and case reports written, data sampling will be conducted and evaluated for each case to determine the quality and

quantity of available data sources. This is necessary, as each of the different research thrusts of the project will require additional levels of in-depth case research for the application of thrust-specific analytical techniques. In preparation for this research project, the research team has engaged relationships with public transportation authorities, infrastructure developers, and private finance institutions that have agreed to provide access to necessary primary and secondary data sources. Combined with other databases compiled by members of our research team, we anticipate this study to be unprecedented in richness of data.

Table 1: Potential Cases: Prior US P3 Road Projects

Project	State	Status	Value (\$M)
SR 91	CA	Operations	130
SR 125	CA	Operations	773
Presidio Parkway	CA	Construction	365
Chicago Skyway	IL	Operations	1,830
Northwest Parkway	CO	Operations	603
I-595 Express	FL	Construction	1,814
Port of Miami Tunnel	FL	Construction	914
Indiana Toll Road	IN	Operations	3,850
SH 130: 5&6	TX	Construction	1,358
I-635 Managed Lanes	TX	Construction	2,800
North Tarrant Expressway	TX	Construction	2,047
I-95 Express Lanes	VA	Construction	940
Capital Beltway Express	VA	Operations	1,998
Dulles Greenway	VA	Operations	350
Pocahontas Parkway	VA	Operations	611
Midtown Tunnel	VA	Construction	2,000

In the second phase of the research, research sub-teams will choose a selection of cases from the project case-set and conduct additional analysis germane to their research thrust. In general, this will begin with the collection of multiple types of qualitative and quantitative data in the form of documents, archival records, semi-structured interviews, participant-observations, physical artifacts, and audio-visual materials (Creswell, 2006; Eisenhardt, 1989; Yin, 2008). Combining multiple data types reinforces, confirms, and verifies emergent aspects of each case in a process of *triangulation* (Corbin & Strauss, 2008). A novel element of this research project is the interwoven analysis of the same cases through multiple analyses with a multidisciplinary emphasis. As stated in the beginning, the interrelated nature of each research thrust influences one another, and must be studied together. Yet each research sub-team will employ specific tools and approaches appropriate for the theoretical basis of their thrust as defined below. The complementary insights gained from multiple analyses will lead to the emergence of a more thorough case description, which can be organized along a time order of events, relationships, etc. (Stake, 1995). Becoming intimately familiar with specific cases allows researchers to

understand unique aspects of individual cases prior to analyzing the generalized patterns across the cases. Our use of multiple investigators in writing initial case reports, and then for conducting in-depth analysis, provides “complementary insights,” and increases confidence as “convergent perceptions” are developed for each case (Eisenhardt, 1989). Also in year three, final case reports will be written that combine initial case observations with multiple in-depth analyses, and observed variation over time.

Thrust 1 Research Method – Relational Contracting

The goal of this research sub-team will be to study how formal contracts, sociological mechanisms, work process design, (including use of technology) and psychological and cultural mechanisms can be blended so all three institutional pillars, regulative, normative, and cultural-cognitive, generate cooperative behavior among the internal infrastructure project team members over an extended period. First, to map the legal-regulatory frameworks, we will need to understand the formal contracts and organization structures in place among project delivery participants. We will study 3-4 cases from the original case set. We will adapt our quasi-longitudinal approach by selecting cases in the design/construction phase, and cases in operations. Cases will also be selected on quality of data sources. Given the need for rich depth, rigorous archival data methods will be used to gather contracts, organization charts, job descriptions, and work process specifications (e.g., procedures for initiating change order requests). Formal project meetings and other means of coordination, including technologies such as project intranets, shared building information models and the like are the information bridges between formal and informal structure (Dossick & Neff, 2009). We will combine retrospective interviews and analyses of secondary data to focus these findings. Next, to examine the normative components, we will look at the way in which teambuilding activities, co-location of key project participants, and ongoing extracurricular activities such as intramural sports teams, golf tournaments etc., are being used to build social networks (indeed social capital). We also examine the role played by occupational norms and professional standards in governing behavior. Finally, we will explore cultural-cognitive devices used to build and sustain shared project identity over time among project delivery partners. These would include the development and communication of a strong, compelling vision statement by its leadership team. We also examine the cognitive framing of choices. The use of project logo clothing, paychecks issued from a single project bank account, a single project e-mail server and website, etc., will be ascertained from archival data, observations and interviews. In order to see how the project emerges over time as cooperation, formal contracts and team identity change, we will interview the key stakeholders twice, with a year in between.

We will assemble all of the contractual, normative, and cultural-cognitive governance mechanisms on each of the projects along with information about their outcomes to date, code them using qualitative research coding tools like nVivo, and then use methods like Qualitative Comparative Analysis (QCA) (Ragin, 2008) to look for “governance recipes” that lead to different project outcomes. We can similarly use data coding and QCA analysis to look for recipes that define the interaction effects between variables in the stakeholder engagement process, the project contract network and the social and psychological mechanisms that can most effectively and feasibly be used with each.

Thrust 2 Research Method – Public Finance / Institutional Finance

The principal goal of this research sub-team will be to study how project shaping and structuring decisions are manifested in contractual provisions in concession agreements (between the owner

and project sponsors) and within SPVs (between project sponsors, investors and selected subcontractors). Underlying this thrust is the proposition that introducing flexibility as real options or other mechanisms can produce methods for coping with project uncertainties in a manner that preserves public sector and private investor confidence. The team will investigate six to eight P3s at different stages of development as case studies. Regardless of stage, the team will use archival documents, semi-structured interviews with key stakeholders, and participant observation to the extent possible for data collection and analysis. The stage of development will, however, alter the types of documents available, interviews conducted, and observations possible. Archival data will include procurement documents, contracts, bond statements/loan agreements, meeting minutes, and third-party publications such as S&P/Fitch/Moody ratings and trade journal articles. For efficiency and cross-fertilization, we will exploit synergies in data requirements with Thrust 1.

By studying projects in different phases of the lifecycle, the team will have the opportunity to examine *ex ante* and *ex post* activities and conditions to view how the project's stakeholders handled various circumstances. We will follow the process for identifying candidate flexibilities of De Neufville and Scholtes (2011), adapting it as necessary for a “system” of contracts. As an example, during the planning or procurement phase, the team will examine the shaping episodes described by Miller and Olleros (2000) to determine how and when contractual “lock-in” decisions are made; the timing and nature of these decisions can both preserve options (e.g. not exercising an option too soon) and generate options. For instance, project financing can be influenced by both internal and external project conditions. The due diligence and experience of the project team may lead it toward a suboptimal financial package or leave it without the capacity to switch to another arrangement should subsequent circumstances dictate the need to do so. In the I-595 Express project, the owner essentially retained a switching option when it selected a consortium with both global experience and financial reach. When the economic crisis hit in 2008, the consortium was able to change its financial plan from private activity bonds to commercial bank loans in a timely manner and without a significant change in financing terms. Once options of this sort are discovered, the team will explore how they may be structured to provide “value” to the public and private sectors – as each tends to measure it.

Thrust 3 Method – Sustainable Team Development

The goal of this research sub-team will be to study how external stakeholders are “connected” to each other and to the project's internal stakeholders (what types of relationships and ties), how these networks change over time, how external stakeholder's perceptions influence the project, and what mechanisms are used to engage and manage external stakeholders and their perceptions. These elements are central to understanding how to develop a sustainable project team, capable of supporting a project through the different lifecycle stages. In order to unpack these concepts, we will select four cases from the initial P3 case studies defined above, and explore them in greater depth. There are numerous variables that play a role in case studies and this thrust of the research will employ a maximum variation approach in “theoretically sampling” the cases for in-depth study (Eisenhardt & Graebner, 2007; Flyvbjerg, 2011).

We postulate that variation in the market setting for P3s, influences the constellation of network actors, how they interact with each other, the capabilities of public governments, perceptions of legitimacy of P3s generally, and many other elements of the institutional environment (i.e. a state with mature policies for P3s will be different from a state with P3 policies in their infancy (Scott, 2012). As Jooste and Scott (2012) point out, in some arenas, relatively effective networks of organizations provide “enabling fields” that support PPP project development and completion. Therefore, we will sample two cases from each of two different state policy “markets” to maximize variation between institutional environments of P3s. We chose two projects from each market to capture variation across time. One case from each of the two markets will be near financial close. This will allow researchers to retrieve reliable data for the development and construction phases of the P3 projects. The other two cases will be P3s in full operation. This will provide a contrasting analysis of project networks and stakeholder management mechanisms for P3s that have achieved financial close, been commissioned, and dealing with factors such as tolling that are relevant to the operations and maintenance phases. Figure 2 provides an illustration of the block-type case analysis setup varying across time and maturity of institutional environment. Cases for in-depth analysis will also be selected based on access to high quality data sources, e.g. project meeting records, well covered by public media outlets, and numbers of available participants for semi-structured interviews.

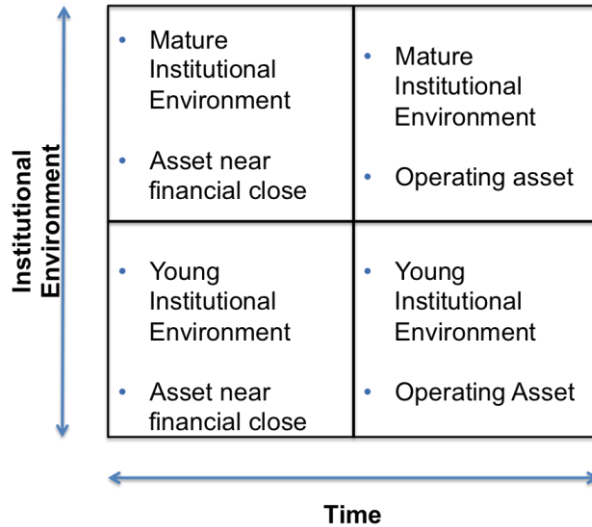


Figure 2: Thrust three, in-depth case selection factors

Initial mapping of stakeholders will come from year one case reports. This will give researchers direction as to who should be interviewed and where to find secondary data sources. An iterative process of mapping, interviewing and analysis will reinforce and clarify the network map. Social Network Analysis (SNA) will be used to understand structural relations between stakeholders the patterns of those relations (Knoke et al., 2008; Scott, 2000). Researchers will use software, such as, UCINET to conduct SNA of the P3 project networks. The networks for each project will be mapped near the end of year one, and then again at the beginning of year three. This will give researchers an opportunity to get accurate actual longitudinal data for a portion of each project’s process. To review secondary data, researchers will employ content analysis techniques to gauge the level of positive or negative association between actors, as associated with specific project issues. High quality media databases, such as Factiva, will also be used to gather and analyze data available from traditional media outlets (Henisz et al., 2011).

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EXPECTED RESULTS

Each of the three research thrusts into which this project is being divided will integrate insights from existing theory in two or more of the disciplinary areas that we identified as

relevant to the governance of infrastructure projects in Fig 1. Collectively, they will begin to relate theories from all of these disciplinary areas, as shown in Figure 3.

Developing a comprehensive and powerful unified governance theory to describe and prescribe governance approaches for these extremely challenging, cross-sectoral transactions is clearly a long-term endeavor. However, research to date in this area has been so fragmented that we are confident our multi-method, cross disciplinary case study approach will begin to lay out a more coherent and robust theoretical framework for the governance of these extremely challenging kinds of organizations, and will serve to guide future research to begin refining the framework and filling identified gaps in it.

Governments and companies that collaborate in the development, construction, and operation of large-scale infrastructure projects such as highway programs take on a set of “wicked” problems. Combining and balancing public and private interests, short and long-term benefits, legitimacy and efficiency, multiple shifting stakeholders, occupations, and interest groups—they pose complex managerial and governance challenges for those seeking to organize them. The structures created to confront the challenges combine contractual, hierarchical and network based modes of organizing (Orr et al., 2011).

To understand and interpret these efforts, social scientists have called, variously and in piecemeal, on legal, economic, managerial, political, sociological and psychological concepts and arguments (Beamish & Biggart, 2010; Child, 2000; Galbraith, 1977; Gereffi, 2005; Hodgson, 1989; Kostova & Zaheer, 1999; Moe, 1990; Williamson, 1975). We seek to better combine and integrate these disciplinary frameworks (see Figure 3) by employing a comprehensive institutional scaffolding that encompasses political-legal, economic and sociological, and cultural-cognitive elements that, together, can provide “thick” and flexible mechanisms of project governance. Each of the elements is linked to differing mechanisms of influence and control, which tap into differing bases of legitimacy, and address varying issues. In combination, they can give rise to robust governance systems, effective under various and changing conditions, as a number of scholars are beginning to recognize (Davies & Hobday, 2005; Flyvbjerg et al., 2005; Greif, 2006; Henisz et al., 2012; Miller & Lessard, 2000; Ostrom, 2009; Peng et al., 2008; Scott et al., 2011). It is to the integration of these various literatures that we hope to contribute.

Expanded delivery of high quality civil infrastructure will deliver enormous public health and economic benefits for societies worldwide. To the extent our research can advance the long term quality of governance for infrastructure, institutional investors will pour capital into P3 infrastructure delivery to provide these benefits.

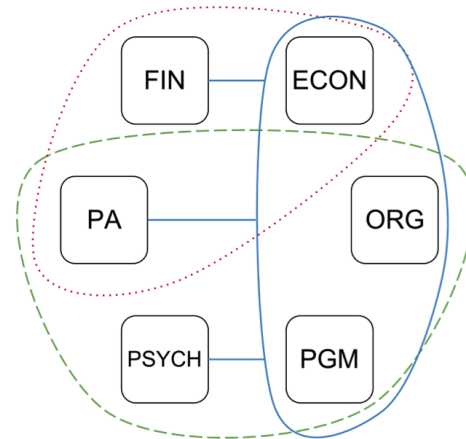


Figure 3: Integrated disciplinary perspectives along three concurrent research thrusts

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