Assessing the Performance of Public-Private Partnership Highway Projects: From Anecdotes to Comprehensive Evidence

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Academic Abstract

Over roughly the last three decades, governments worldwide have implemented public private partnerships (P3s) to mobilize both private funds and public resources to develop transportation infrastructure, which has provided private entities contemporary opportunities to design, finance, construct, operate and maintain these important assets. Typically, P3s are large and complex undertakings that involve and impact many stakeholders, including public officials, financiers, builders, business owners and taxpaying citizens. Consequently, their efficacy depends – to a great extent – on how well they meet the interests of this array of stakeholders. Hence, effective assessment of P3s is crucial to determine whether these infrastructure initiatives and project outcomes satisfy these stakeholders' interests throughout a P3's life-cycle.

Researchers and practitioners have considered various aspects of P3s when considering their performance. In general, the current research landscape related to P3 performance includes two major areas: (1) the identification and implementation of critical success factors (CSFs) and key performance indicators (KPIs), and (2) the development of frameworks that conceptualize approaches to measure P3 performance. Numerous studies have focused on CSFs that are the "ingredients" of effective P3s. More recent studies have emphasized KPIs that are metrics to assess them. Alternatively, some research has taken a life-cycle approach to propose approaches for P3 evaluation that are more comprehensive than assessments of P3 delivery time and cost. While this research has produced useful insights, limited emphasis has been placed on assessing P3 performance comprehensively and beyond the public and private sector dichotomy. Therefore, this research develops a framework that identifies and assesses key stakeholder interests in P3s as a means to characterize their performance. Subsequently, this framework was employed in a case study of four P3 projects to evaluate how well these cases met stakeholder expectations and ultimately performed. The research to develop the framework and conduct the case study was organized in three integrated studies.

The first study employed a systematic literature review of CSFs and KPIs where the extant literature remains largely segmented and fragmented. Synthesis of the literature helped to identify and characterize various CSFs and KPIs and their current employment within the P3

performance domain. This led to the development of a CSF-KPI framework that integrates these factors and indicators throughout a P3 project's lifecycle.

The outcome of the first study served as the foundation for the second study where the framework to assess stakeholders' interests was constructed. In this process, the second study followed a systematic approach by integrating key components to assess performance. The development process involved several key steps: (1) identification of the key stakeholders – specifically the state (elected bodies and executive agencies), investors (equity providers), producers (project service providers) and users/citizens (individuals or groups impacted by a project); (2) characterization of their principal interests; (3) selection of indicators of these interests; (4) linkage of the indicators with 11 performance dimensions ranging from project environment to revenue and operations; and (5) connection of the performance dimensions with four levels of performance: planning, project management, business, and future potential. The framework was demonstrated and substantiated using data from the I-495 Capital Beltway Express project. The application confirmed the replicability of the framework.

The final study utilized the framework to evaluate P3s effectiveness in serving stakeholders goals and objectives. A multiple case study was conducted of four P3 highway projects in the United States: I-495 Capital Beltway Express, LBJ Expressway, SR 125 (South Bay Expressway), and SH 130 (5&6) to examine the extent that state, investor, producer, and user/citizen interests were fulfilled. Overall, I-495 and LBJ Expressway met stakeholder interests more effectively than SR 125 and SH 130 (5&6); these two cases had stronger planning, project management, and business performance. Notably, the I-495 case was an unsolicited (or market lead) proposal that followed a collaborative planning process to shape and define the project to meet mutual interests while the LBJ Expressway case utilized a competitive best-value procurement to generate an innovative technical solution that reduced the project's cost and footprint. Whereas SR 125 and SH 130 (5&6) experienced various issues that led to their bankruptcy; the new owners of both projects have taken steps to improve their outlook.

Overall, the research deepens understanding of the factors that impact stakeholder interests and their expectations of P3s, presents a holistic framework for P3 assessments, and provides evidence of how well multiple P3s performed, moving beyond conceptual frameworks that are currently found in the literature.

Assessing the Performance of Public-Private Partnership Highway Projects: From Anecdotes to Comprehensive Evidence

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General Audience Abstract

Public-Private Partnerships (P3s) have been adopted extensively to facilitate the development of transportation infrastructure. The need for more efficient and effective P3 projects makes performance assessment increasingly important, especially with respect to stakeholder interests and expectations. Also, effective and efficient assessment of P3 performance is crucial to determine whether this infrastructure development strategy meets owners and stakeholders needs throughout the P3 project lifecycle. The absence of an effective and comprehensive approach to evaluate P3 performance can result in reliance on anecdotal evidence, which may inaccurately portray the outcomes of these projects. While numerous studies have examined multiple facets of P3s over the last two decades, limited emphasis has been placed on comprehensively assessing their performance. Consequently, the purpose of this research is to advance the state of knowledge of P3 project performance in the transportation sector. To realize this purpose, this dissertation performed three integrated studies. The first study examined the current literature to identify factors that influence P3 outcomes and metrics that measure them. The second study developed a performance assessment framework, which captures various phases of a project's life cycle and considers the perspectives and objectives of the range of stakeholders involved in or impacted by P3s. Further, the framework was demonstrated and substantiated using data from the I-495 Capital Beltway Express project. Finally, the third study examined four cases in the US market – I-495, LBJ Expressway, SR 125 (South Bay Expressway), and SH 130 (5&6) – to examine to what extent state, investor, producer, and user/citizen interests were fulfilled. The case study illustrated that I-495 and LBJ Expressway met stakeholder interests more effectively than SR 125 and SH 130 (5&6); I-495 and LBJ Expressway fulfilled their implementation, financial and service expectations whereas SR 125 and SH 130 (5&6) experienced implementation issues and financial distress. Overall, these studies support improved understanding of the factors that impact stakeholder interests in P3s and provide evidence of how well four P3s projects performed over time.

To my father and my mother

My wife

and my two daughters

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Contributions of co-authors of each manuscript in this dissertation:

Chapter 2: Review of Critical Success Factors (CFSs) and Key Performance Factors (KPIs) in Performance Assessment of P3 Projects

- Ahmed, Manik: conducted the research and was lead author
- Garvin, M. J.: advised on research design and implementation; reviewed, and copyedited the manuscript

Chapter 3: Development of a Framework to Assess Key Stakeholders' Interests and Levels of Performance in Public Private Partnership Highway Projects

- Ahmed, Manik: conducted the research and was lead author
- Garvin, M. J.: advised on research design and implementation; reviewed, and copyedited the manuscript

Chapter 4: Assessing Stakeholder Interests and Performance of Four Public-Private Partnerships Highway Projects in the United States

- Ahmed, Manik: conducted the research and was lead author
- Garvin, M. J.: advised on research design and implementation; reviewed, and copyedited the manuscript

Chapter 1 Introduction

1.1 Performance in Public-Private Partnerships

Increased demands and restrictions on public resources in the transportation sector have resulted in more private sector involvement through Public Private Partnerships (P3s).The goals and objectives of P3s are broad and include: saving cost and construction time, establishing better relationships between public and private sectors, accelerating project delivery, maintaining a high level of service quality, and fostering economic growth (Garvin and Bosso 2008; Garvin 2010). Moreover, a variety of stakeholders are involved in P3s, and these stakeholders have different interests, motivations, and expectations. Yet, P3s are often dichotomized as an arrangement between the public and private sectors (Klijn and Teisman 2003). Not surprisingly, the desired outcome for a P3 is often characterized as a "win-win" (Eshun et al. 2020). Such characterizations oversimplify P3s, given the array of stakeholders involved. Accordingly, efforts to evaluate P3 outcomes or performance must move beyond the public-private dichotomy and consider a broader and richer set of interests. For example, P3 projects are often politically sensitive, so the focus of a public agency's evaluation of performance may be centered on political factors, legislative issues, or risks (Hodge and Greve 2007). Similarly, the private sector's assessment of performance is likely weighted toward financial and managerial issues, which includes handling risk and uncertainty to achieve expected returns (Hodge and Greve 2005). Whereas citizens may have concerns about the accountability of public or private actors in these arrangements (Shaoul et al. 2012) or simply expect their input about pending P3s to be valued (Nederhand and Klijn 2019). Ultimately, P3s performance will be judged by how well they meet stakeholders' interests, so they should be evaluated this way. Within the complex nature of P3s, a need exists for a thorough and well-structured means of identifying and capturing stakeholders' interests throughout the life cycle of P3s since their varied interests have direct and indirect impacts on P3 performance.

1.2 Broader perspectives of performance

P3 performance measures refer to a broad classification (quantitative and qualitative) of desired outcomes derived from stakeholders' goals and objectives associated with these long-term contractual agreements to develop and operate an infrastructure asset. Scholars and practitioners have attempted to assess their performance. Many P3 successes and some failures

have been reported in the normative literature (Hodge and Greve 2005; Duffield 2004; Regan et al. 2011). Unquestionably, P3s experience many issues, so understanding the source of such issues is critical. The scope of P3 performance-related research is large. Studies focused on cost and time measures, particularly during the design and construction phases, to evaluate performance (Bassioni 2004;Chan and Chan 2004). Numerous researchers have utilized critical success factors (CSFs) and key performance indicators (KPIs) to characterize and evaluate performance (Jacobson and Ok 2008a; Li et al. 2005c; Qiao et al. 2001). Some authors have developed conceptual frameworks for P3 assessments (Neely et al. 2005; Zhang 2005) as well as adopting lifecycle perspectives (Haponava and Al-Jibouri 2012; Liu et al. 2015c). Despite the value of prior work, existing approaches do not give enough attention to stakeholder interests over the lifecycle of P3s. Therefore, current approaches to assess P3s do not reflect their dynamic and complex nature. Further, such assessments must consider for whom is performance being evaluated?

As noted, the public-private dichotomy is common in P3 literature. This is not unwarranted since the public sectors' strategic objectives form the foundation of P3 infrastructure projects. Through the P3 scheme, the public sector can manage and fulfill its overall aim to provide the public with necessary services. Meanwhile, P3s allow the private sector to be engaged in a long-term development and payoff strategy through delivery of public facilities and quality services (Garvin and Bosso 2008). Hence, it is crucial to understand the implications of policy and guidelines on both private and public sector objectives (Albalate et al. 2020). In addition, while the public sector justifies the project need and P3 determination by assessing a project's social and economic feasibility, the private sector tends to focus on aspects such as project attractiveness, government commitments, and availability of financial enhancements (Abdel Aziz 2007). Further, the importance of fairness and reliability in procurement are key interests of the public and private sectors; the public sector generally seeks to introduce competition in procurement to attain the best value. Similarly, equitable risk allocation is a common interest to both parties since strategies for managing and mitigating risks are vital to project outcomes (Nguyen et al. 2018). During project implementation, the private sector emphasizes on budget and on time delivery while the public sector expects to receive the specified asset and services (Lam and Javed 2015). All the while, other stakeholders like citizens, businesses and public officials have their own interests as P3s are shaped and delivered.

Therefore, an adequate and structured means of identifying and capturing these stakeholders' interests over the project lifecycle is paramount. Ultimately, the fulfillment of these varied interests dictates whether a P3 generates "wins" for its multiple constituents.

Hence, the overarching objective of this research was to develop a framework to assess the extent that the interests of key stakeholders in P3 projects are met, which is indicative of overall P3 performance. In other words, if interests are satisfied, then a P3 project has served its key constituents. This framework supports considering such interests across a P3 project's lifecycle. Once developed, this framework was employed in a case study to examine how well stakeholder interests were fulfilled in four P3 projects with varying characteristics. The case study supported conclusions about the performance of these projects from planning, project management, and business perspectives.

1.3 Research Approach and Dissertation Organization

Accordingly, this research tackled the goal of identifying and assessing stakeholder interests in P3s as a means to characterize their performance. The research set out to accomplish this goal through three investigations.

Study 1: The goal of this study was to identify the factors that contribute toward P3 performance in transportation and how they influence P3 outcomes. To achieve this, it is essential to know what factors (i.e., CSFs and KPIs) and driver(s) researchers have identified and linked to P3 performance. Through a systematic literature review, factors such as CSFs and KPIs were identified and synthesized in Chapter 2: Review of Critical Success Factors (CFSs) and Key Performance Factors (KPIs) in Performance Assessment of P3 Projects.

Study 2: Once CSF and KPIs were identified and categorized, the goal of Study 2 is to develop a framework that can capture the dynamics of a P3 project's life cycle and that consider the perspectives and objectives of the range of stakeholders involved in or impacted by P3s. To achieve this, the following steps were taken: (1) identify principal stakeholders directly and indirectly impacted by a P3 project, (2) identify their potential interests with respect to P3 performance or outcomes, (3) select indicators to determine the extent that stakeholders' interests are being met, and (4) associate the identified interests with dimensions of performance. This approach links interests, indicators, and performance dimension across the life cycle of a P3 project. Once this normative framework was developed, it was demonstrated and substantiated

with a case project. The outcome is Chapter 3 Development of a Framework to Assess Key Stakeholders' Interests and Levels of Performance in Public Private Partnership Highway Projects.

Study 3: The last study examined how a set of case studies of P3 projects in the US highway market have performed by evaluating how well principal stakeholder interests were fulfilled over time and why such performance was observed. The framework developed in Study 2 is used as the basis for Study 3. A case study protocol was followed, and interviews were conducted under IRB 20-723. A database was prepared to combine project documents, archival records, and interview transcripts for each case. This information help to triangulate the evidence from these different sources. The outcome of this phase is Chapter 4: Assessing Stakeholder Interests and Performance in Four Public-Private Partnerships Highway Projects in the United States.

Chapter 2 Review of Critical Success Factors (CFSs) and Key Performance Factors (KPIs) in Performance Assessment of P3 Projects

Abstract

What is a successful P3? The normative literature has continued to expand 'factors of success' and 'measures of performance' for public-private partnerships (P3s), and fundamental variations remain in the use of such factors and metrics to assess P3s. The existing literature is rich with investigations of critical success factors (CSFs), key performance indicators (KPIs) and P3 drivers that are linked to P3 performance and outcomes. Studies have characterized CSFs as "ingredients" necessary for P3 success and KPIs as the "metrics" to evaluate P3 outcomes or performance. As work in the area has progressed, this literature has evolved to consider CSFs and KPIs more holistically by broadening the factors considered to social, political, economic, and financial categories. These areas in the literature are rather distinct; yet CSFs and KPIs sometimes serve as substitutes for one another since the definition and classification between CSFs and KPIs remains elusive. We characterize and synthesize the literature on CSFs and KPIs to identify how to employ these ingredients and metrics to assess various aspects of P3 performance. Based on the synthesis, a CSF-KPI framework is proposed that can support the assessment of P3 projects. This study provides a holistic perspective of the CSF and KPI literature and suggests a means to utilize these factors to evaluate P3 project success and outcomes for both researchers and practitioners.

Keywords: Critical Success Factors, Key Performance Indicators, PPP/P3, Performance

2. 1 Introduction

Over roughly the last three decades, public agencies have adopted public-private partnerships (P3s) to develop needed transportation infrastructure. These arrangements have had their fair share of problems; It is not surprising because P3s are very uncertain and have a wide range of pitfalls, the multiplicity of stakeholders involved, and the general lack of experience with these arrangements. The increased use of P3s in the late 1990s and early 2000s led to heightened academic attention about this phenomenon. Among the topics explored were several early studies that identified and developed Critical Success Factors (CSFs) for P3s.These studies focused on developing and identifying critical success factors. Early works focused on factors in the planning or pre-construction phases as actual projects progressed through or completed these stages of development. For instance, Bing et al. (2005) derived a set of CSFs from the literature, and surveyed public and private sector respondents to determine the relative importance of CSFs; based on the survey results, they conducted a factor analysis to create factor groupings of CSFs. Similarly, Zhang (2005b) developed a set of CSFs and surveyed subject matter experts to calculate a significance index for CSFs.

Subsequently, attention shifted toward Key Performance Indicators (KPIs) as P3s transitioned into implementation and operation phases. Studies proposed KPIs as potential metrics to measure performance. Yuan et al. (2009) identified various performance objectives throughout the lifecycle of P3s, and surveyed representatives of academia, the public and private sectors, and the general public; various statistical analyses were done to determine the principal expectations of these stakeholder groups, and subsequently KPIs were proposed to assess P3 performance. Mladenovic et al. (2013) pinpointed CSFs and KPIs using subject matter experts and a literature review; these CSFs and KPIs were then organized by relevance to the public sector, private sector, and users.

Hence, two distinct but related bodies of literature have emerged over time – one focused on the "ingredients" for success, CSFs, and one focused on gauging outcomes, KPIs. Scholars have highlighted the importance of CSFs and KPIs to achieve project goals and objectives, as well as linking these goals and objectives to performance assessment. Not surprisingly, comprehensive reviews of this research began to appear with the expansion of this literature. For instance, Osei-Kyei and Chan (2015) completed a literature review of CSFs in P3s for papers

published from 1990 to 2013. Certainly, past literature examining CSFs and KPIs for P3s can serve as a foundation for developing a comprehensive approach for assessing their lifecycle performance. Consequently, this investigation synthesizes past research in this area, which is an essential step toward improving assessments of P3 performance. Even though CSFs and KPIs have received considerable attention, limited work has examined both CSFs and KPIs to explore their definition, use, and classification over the different phases of P3 projects. Therefore, a comprehensive understanding of this literature advances knowledge of factors and indicators associated with P3 performance.

In this context, this paper has two objectives. First, it synthesizes literature focused on CSFs and KPIs in P3 projects. Second, it proposes a CSF-KPI framework to convey how CSFs and KPIs can be positioned and utilized to assess P3 outcomes and performance. Given the broad spectrum and coverage of CSF and KPI studies in the P3 domain, the study provides a better understanding of determining and distinguishing these factors critical to P3 project success, delivery, and performance. Therefore, the study became beneficial for both researchers and practitioners since it highlights the current state of knowledge of CSFs and KPIs and suggests a way to employ these factors and indicators in P3 assessment.

2.2 Research Methodology

In order to fully examine and analyze the findings of previous research studies on CSFs and KPIs, a systematic literature search process was followed based on the approach adopted by Osei-Kyei and Chan (2015). They completed a synthesis of CSF literature published between 1990-2013, and their methodology followed the precedent of previous literature review studies in civil engineering and construction management. The process followed first identified target journals and then relevant papers. Subsequently, the content of relevant papers was analyzed.

2.2.1 Identification of Journals and Articles

The Scopus database was selected because it covers publications in various areas such as engineering, economics, management, and social sciences. Aside from Osei-Kyei and Chan (2015), several literature reviews in the field of construction engineering and management have used this powerful search engine (Hong et al. 2014; Ke et al. 2009). A comprehensive search was done under the “title/abstract/keyword” field of Scopus. Search keywords used a combination of terms related to CSFs or KPIs AND PPPs such as “critical success factors”, “critical factors”,

“success factors”, “key performance indicators”, “performance indicators”, “core indicators”, public private partnerships”, “private finance initiative”, “PPP”, “PFI”, “BOT”, “BOOT”, and “DBFO”. The search terms used were expected to cover the majority, if not all, of the work involving CSFs and KPIs relevant to P3s in the transportation sector. In addition, the search was limited to only retrieve articles or reviews published in journals in English. The full search code for papers about CSFs and P3s is listed below; to search for papers about KPIs and P3s, the first argument was changed to (TITLE-ABS-KEY ("key performance indicators" OR "performance indicators" OR "core indicators"):

TITLE-ABS-KEY ("critical success factors" OR "critical factors" OR "success factors") AND TITLE-ABS-KEY ("public private partnerships" OR "private finance initiative" OR "ppp" OR "pfi" OR "bot" OR "boot" OR "dbfo") AND AND PUBYEAR > 1989 AND PUBYEAR < 2021 AND (LIMIT-TO (DOCTYPE , "ar") OR LIMIT-TO (DOCTYPE , "re")) AND (LIMIT-TO (PUBSTAGE , "final")) AND (LIMIT-TO (LANGUAGE , "English")) AND (LIMIT-TO (SRCTYPE , "j")).

First, the results of the search were examined to select target journals based on the number of CSF or KPI publications related to P3s in the journal. Nearly 30 journals had published at least two articles about CSFs or KPIs in P3s. Among these were: Advances in Civil Engineering; Built Environment Project and Asset Management; Construction Management and Economics; Engineering, Construction and Architectural Management; Facilities; Habitat International; International Journal of Project Management; Journal of Construction Engineering and Management; Journal of Infrastructure Systems; Journal of Management in Engineering; and the Journal of Facilities Management. These are well-known journals in the field, so the papers selected were further limited to the journals with two publications or more. This resulted in 139 papers retrieved from Scopus: 118 CSF papers and 21 KPI papers.

Next, the title and abstract of the remaining papers were reviewed. Those papers that were not focused on P3s generally or P3s in transportation were excluded; 15 articles focused on housing, energy, solid waste, etc. were excluded. Subsequently, the abstract, introduction and conclusion of the remaining articles were examined. This process excluded 51 papers that were out of the scope of this study: for instance, comparison studies, private sector behavior, profit distribution, transition condition, etc. The remaining 74 articles underwent a full-text review; those excluded were evaluated on case-by-case basis where the majority were focused on very specific contexts such as bankable completion risk, post-construction outcomes or concession

period duration. This step eliminated 18 articles, so 56 articles were identified for detailed examination and analysis: 45 CSF papers and 11 KPI papers. Overall, the selected 56 articles emphasize the identification of CSFs and KPIs and their use to assess P3s. Despite the extensive search process followed, the papers retrieved are not exhaustive and inclusive of all relevant publications; rather, they are a representative sample of the research done in this domain.

2.2.2 Research Paper Examination

Some basic descriptive statistics were developed on the final set of papers to understand publication trends and the publications sources. More importantly, the content of these was analyzed to determine: (1) what factors or indicators each paper identified, (2) what methodology was followed for their identification, and (3) how authors characterized and examined the factors or indicators. While examining the articles, the principal aim was to organize and elicit how researchers captured and interpreted the CSFs and KPIs relative to P3 success/performance (Bengtsson 2016). For example, if authors prioritized CSFs or KPIs, then what process was followed. Subsequently, frequency analyses of the CSFs or KPIs identified in each paper were completed to gauge the relative importance of the factors or indicators found in the literature. Next, the factors and indicators frequently named in the papers were grouped into common thematic areas; this supported examining CSFs and KPIs by their applicability to different aspects or lifecycle phases of P3s. This synthesis supported mapping the CSFs and KPI into an overall framework to depict how these factors and indicators might be used to examine the performance of P3s.

2.3 Results

2.3.1 Sources of Articles

The 56 papers selected and reviewed were published in 29 different journals. Table 2-1 lists these journals. The top six journals with the most papers International Journal of Project Management (8 articles), Engineering, Construction and Architectural Management (6 articles), Journal of Construction Engineering and Management (5 articles), Built Environment Project and Asset Management (5 articles) and Journal of Management in Engineering (5 articles) and Journal of Facilities Management (3 articles) .

Table 2-1 Journal sources of the selected articles

CSF Literature		KPI Literature	
Journals	**No.**	**Journals**	**No.**
International Journal of Project Management	8	Built Environment Project and Asset Management	2
Engineering, Construction and Architectural Management	5	Journal of Management in Engineering	2
Journal of Construction Engineering and Management	5	Journal of Infrastructure Systems	1
Journal of Management in Engineering	4	Journal of Modern Project Management	1
Built Environment Project and Asset Management	3	Journal of Economic and Administrative Sciences	1
Journal of Facilities Management	3	Transportation Research Record	1
International Journal of Construction Management	2	Engineering, Construction and Architectural Mgmt	1
International Journal of Public Sector Management	2	Intl Journal of Strategic Property Management	1
Journal of Infrastructure Systems	2	Construction Management and Economics	1
Advances in Civil Engineering	1		
Construction Economics and Building	1		
Construction Management and Economics	1		
Facilities	1		
Habitat International	1		
Journal of Financial Management of Property and Const.	1		
Journal of Modern Project Management	1		
Proceedings of Institution of Civil Engineers: Management, Procurement and Law	1		
Property Management	1		
Sustainability (Switzerland)	1		
Transport Policy	1		
Total	**45**		**11**

2.3.2 Trend of Publications

Figure 2.1 illustrates the longitudinal trend of CSF and KPI literature. The growing interest in this area over time is evident. CSF papers have risen from one in 1992 to 40 in 2020 while KPI papers have risen from one in 2009 to 11 in 2020; the majority of papers in both categories have been published in the past 10 years. Moreover, the interest in KPIs is relatively

recent compared to CSFs; this is likely a consequence of the increasing number of P3 projects moving into implementation and operations over the last decade.

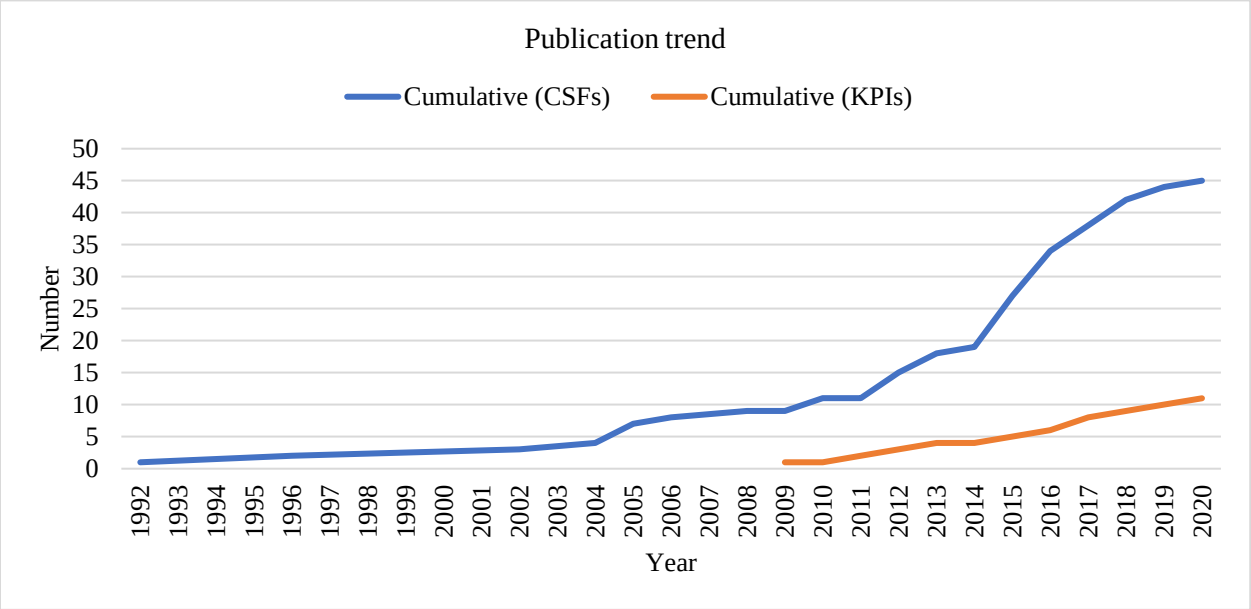


Figure 2.1 Cumulative publication (1990-2020) of 56 articles.

2.3.3 Research Characteristics

The methods used to explore the CSFs and KPIs in the P3 literature fall into four major categories: (1) questionnaire surveys, (2) case studies, (3) semi– structured interviews, and (4) literature-based reviews. By far, questionnaire surveys are the most frequently used approach (72%); this is not terribly surprising since this is an effective way to elicit perspectives of a large sample of subject matter experts about a contemporary phenomenon such as P3s. 14% of the papers are based on "conceptual studies" .The remaining papers followed either case studies or semi- structured interviews or combining both (7%). Interestingly, this result matches with the findings of Taylor and Jaselskis (2010), who identified that survey/questionnaire research methods were most frequently used in the field of construction engineering and management.

2.4 Mapping CSF and KPI Literature

Before explaining the literature mapping, characterizing CSFs and KPIs for P3s found in the literature deepens understanding of these two areas of research. CSFs capture key areas or activities that potentially influence project goals and objectives. This leads to the definition of CSFs as the "ingredients" of P3 project success or what is "needed" to make a P3 project

successful. On the other hand, KPIs are used to assess and evaluate performance based on defined performance objectives and indicators. KPIs serve as metrics to indicate outcomes such as progress between planned and actual achievement. For instance, factors like stable political environment, transparency in procurement, etc. are examples of project-level CSFs. On the other hand, KPIs typically are metrics and may include but are not limited to project benchmarks, targets, milestone dates, indexes, ratios, or survey data (Garvin et al. 2011). Table 2-2 differentiates CSFs and KPIs by their definition, interpretation, characteristics, and examples.

Table 2-2 Definition and characterization of CSFs and KPIs

Criteria	**CSFs (Critical Success Factors)**	**KPIs (Key Performance Indicators)**
Definition	Expected to be interdependent variables towards desired P3 expectations and outcomes.	More specific milestones or measurable components of performance
Interpretation	The "cause" of success or what "needs" to make a P3 project successful	Indicate progress between planned and actual achievement or metrics of outcomes
Characteristics	Qualitative in nature and prominent planning and pre-construction phases	Quantitative in nature and relatively prominent in implementation and service delivery phases
Examples	Transparency in procurement, Appropriate risk allocation, Good governance, etc.	% in progress, total no. and rate of accidents, trips by person-mile/or vehicle-mile, % changes in budget, etc.

2.4.1 Critical Success Factor (CSFs)

While scholars may define the concept of CSFs somewhat differently, these factors generally represent the same principle: core parameters or "ingredients" for P3 success/performance; in addition, they tend to reflect the effect of particular factors on P3 performance and outcomes. Many authors and researchers have identified CSFs, and several researchers have identified, developed, and prioritized CSFs as a means to achieve P3 project outcomes. CSFs have been investigated at both program and project levels as well as within specific project phases.

Table 2-3 Frequency of CSFs in the selected literatures

Critical Success Factors	Selected Articles																																												
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
Favorable legal framework					✓		✓	✓		✓			✓		✓				✓	✓			✓	✓	✓		✓					✓													
Socio-political stability	✓		✓		✓		✓		✓					✓	✓				✓	✓												✓	✓			✓	✓			✓		✓			✓
Government commitment		✓							✓				✓		✓			✓		✓			✓		✓		✓		✓		✓				✓			✓				✓		✓	
Clear project identification		✓				✓	✓	✓	✓		✓	✓		✓					✓					✓	✓								✓		✓		✓		✓	✓					✓
Good feasibility studies	✓		✓		✓		✓			✓			✓						✓		✓					✓				✓	✓	✓				✓									✓
Value for Money (V*f*M) study	✓	✓			✓			✓			✓				✓		✓						✓	✓								✓		✓			✓					✓	✓		
Mature and available financial market		✓	✓				✓					✓								✓							✓		✓					✓											
Project attractiveness (Return on investment)		✓										✓	✓					✓																						✓				✓	
Stable macroeconomic condition	✓			✓							✓		✓	✓				✓								✓				✓	✓						✓	✓		✓				✓	
Government providing guarantees	✓	✓							✓	✓						✓	✓							✓			✓			✓					✓	✓					✓		✓		
Stakeholder engagement and communication				✓	✓	✓	✓	✓		✓				✓							✓	✓				✓		✓			✓		✓							✓					
P3 organization competencies	✓		✓				✓								✓	✓							✓				✓			✓				✓							✓	✓			
Public satisfaction (Protecting interest)					✓				✓								✓		✓				✓				✓								✓				✓						✓
Transparent, competitive, fair tender process	✓			✓						✓			✓	✓			✓				✓			✓				✓			✓					✓		✓		✓					
Level of competition in tendering processes		✓			✓		✓	✓		✓					✓	✓							✓				✓					✓		✓							✓	✓			
Firm's capabilities of fulfilling the contract						✓								✓		✓	✓		✓	✓				✓		✓			✓		✓								✓				✓		✓
Appropriate risk allocation and risk sharing	✓	✓							✓	✓		✓	✓	✓							✓	✓											✓	✓		✓		✓		✓					
Accelerated project delivery	✓			✓							✓				✓														✓	✓	✓						✓								
Efficiencies gained in realization and commissioning of asset and services	✓													✓	✓																														
Promoting local economic development				✓																			✓		✓		✓				✓				✓							✓			
User satisfaction					✓									✓												✓						✓			✓										
Effective interface management in P3 initiation & planning					✓																				✓																				
Effective interface management in P3 partnerships process						✓						✓	✓						✓						✓																				

1. (Ahmadabadi and Heravi 2019a); **2**. (Almarri and Boussabaine 2017a); **3**. (Al-Saadi and Abdou 2016); **4**. (Amponsah and Forbes 2012); **5**. (Babatunde and Perera 2017); **6**. (Chan et al. 2010a); **7**. (Cheung et al. 2012a); **8**. (Chou and Leatemia 2016); 9. (Chou and Pramudawardhani 2015a); **10**. (Hwang et al. 2013b); **11**.(Jacobson and Ok 2008b); **12**. (Jamali 2004); 13. (Jefferies 2006a); **14**. (Jefferies et al. 2002a); 15. (Li et al. 2005a); **16**. (Liang and Jia 2018); **17**. (Liu et al. 2015d); **18**. (Liu et al. 2015e);. **19**. (Liu et al. 2017); **20**. (Liu et al. 2016c); **21**. (Mladenovic et al. 2013a); **22**. (Mota and Moreira 2015); **23**. (Ng et al. 2012a); **24**. (Olusola Babatunde et al. 2012a); **25**. (Opawole et al. 2019); **26**. (Osei-Kyei and Chan 2015a); **27**. (Osei-Kyei and Chan 2017a); **28**. (Osei-Kyei and Chan 2018a); **29**. (Osei-Kyei and Chan 2017b); **30**. (Sanni 2016); **31**. (Shi et al. 2016a); **32**. (Simon et al. 2020); **33**. (Tang et al. 2015); **34**. (Tang et al. 2010a); **35**. (Tang et al. 2013); **36**. (Tiong et al. 1992); **37**. (Tiong 1996a); **38**. (Ullah et al. 2016); **39**. (Vijayabanu and Vignesh 2018); **40**. (Wang et al. 2018); **41**. (Wang 2015); **42**. (Wibowo and Alfen 2015); **43**. (Zhang 2005c); **44**. (Zhang 2005b); **45**. (Zou et al. 2014)

The literature review identified 23 primary CSFs. Table 2-3 depicts the CSFs found in the literature as well as their frequency of mention in the 45 papers. Based on the content analysis, the CSFs were grouped by common themes into six major categories: (1) project environment and planning, (2) economic and market conditions, (3) public sector capacity, (4) effective procurement, (5) project outcomes, and (6) lifecycle perspectives. Table 2-4 depicts each CSFs within its respective group along with their sources in the literature; these groups represent "meta-factors".

Table 2-4 CSFs in the P3 literature

Groups	Critical Success Factors (CSFs)	Source(s)
Project environment and planning	Favorable legal framework	(Osei-Kyei and Chan 2015a); (Osei-Kyei and Chan 2017a);
	Socio-political stability	(Jefferies 2006a); (Zhang 2005c);
	Government commitment	(Chan et al. 2010a); (Tiong 1996a); (Li et al. 2005a)
	Clear project identification	(Jefferies et al. 2002); (Chou and Pramudawardhani 2015); (Liu et al. 2016c)
	Good feasibility studies	(Zhang 2005c); (Almarri and Boussabaine 2017a);
	Value for Money (V*f*M) study	(Liu et al. 2015d); (Ng et al. 2012a);
Economic and market conditions	Mature and available financial market	(Jefferies et al. 2002a); (Zhang 2005b);
	Project attractiveness (Return on investment)	(Jefferies 2006); (Liu et al. 2017);
	Stable macroeconomic condition	(Ahmadabadi and Heravi 2019a); (Zou et al. 2014)
Public sector capacity	Government providing guarantees	(Hwang et al. 2013b); (Jacobson and Ok 2008b)
	Stakeholder management	(Mladenovic et al. 2013); (Babatunde and Perera 2017)
	P3 organizational competencies (finance and procurement expertise)	(Osei-Kyei and Chan 2017b); (Tang et al. 2013)
	Public satisfaction (Protecting public interests)	(Jacobson and Ok 2008b); (Liu et al. 2015e)
Effective procurement	Transparent, competitive, fair tender process	(Zhang 2005b); (Tiong et al. 1992)
	Level of competition in tendering processes	(Mota and Moreira 2015); (Ng et al. 2012a)

	Firm's capabilities of fulfilling the contract	(Jefferies et al. 2002a); (Liang and Jia 2018);
	Appropriate risk allocation and risk sharing	(Olusola Babatunde et al. 2012a); (Ahmadabadi and Heravi 2019a)
Project outcomes	Accelerated project delivery	(Liu et al. 2017); (Osei-Kyei and Chan 2015a)
	Efficiencies gained in realization and commissioning of asset and services	(Liu et al. 2015d); (Ahmadabadi and Heravi 2019a)
	Promoting local economic development	(Jacobson and Ok 2008b); (Opawole et al. 2019)
	User satisfaction	(Jefferies et al. 2002a); (Opawole et al. 2019)
Lifecycle perspectives	Effective interface management in P3 initiation & planning	(Osei-Kyei and Chan 2018a); (Jacobson and Ok 2008b)
	Effective interface management in P3 partnerships process	(Liu et al. 2015d); (Liu et al. 2015e)

A. Project Environment and Planning

CSFs in the project environment and planning category include factors found in the literature that are necessary to enable P3s within a jurisdiction and to prepare and plan for their use. A favorable or reasonable legal environment is frequently mentioned as an integral element for all stakeholders engaged in P3 projects (Albalate et al. 2020b; Chan et al. 2010a; Osei-Kyei and Chan 2015a). Without sufficient legislative authority, both the public and private sectors will confront issues that deter P3 activity or drive-up transaction costs. Researchers have also emphasized political support and government commitment (Jefferies 2006; Zhang 2005); further, the stability of a particular jurisdiction is also significant (Jefferies et al. 2002a). Without sufficient and reliable political support, the political risk for potential private investors may prove too high (OECD 2008).

In addition to the overall project environment, the identification and justification of the need for a project are highlighted. This is a critical step in project planning, particularly for P3s since an unnecessary or unjustified project can result in underutilization or opposition (Zou et al. 2014); several studies have highlighted that a project's consistency with regional long-term transportation goals is indicative of a clear need (Chou and Pramudawardhani 2015a; Jefferies et al. 2002a; Liu et al. 2016c). Subsequently, completion of sound feasibility studies is crucial in the due diligence process for P3s since these suggest if such arrangements may be appropriate

(Almarri and Boussabaine 2017b; Garvin 2010; Zhang 2005). Finally, Value for Money (V*f*M) studies evaluate whether P3s deliver value compared to conventional project delivery, and V*f*M is often viewed as the principal benchmark of the strategic objective of P3s (Liu et al. 2015a; Ng et al. 2012).

B. Economic and Market Conditions

The economic and market conditions category stresses the importance of investment and financial factors on P3 performance. As with any project, a sound economic assessment is of utmost importance; however, the economic viability and attractiveness of a P3 project is critical to potential investors and should be assessed against current and foreseeable economic conditions to determine the expected return on investment (Jefferies 2006; Zhang 2005). Further, such assessments should consider macroeconomic and regional conditions and their impact on financial structuring and arrangements to create a business case for developing P3s (Jefferies 2006; Kurniawan et al. 2015; Liu et al. 2017)

Researchers have also asserted the significance of well-functioning and available financial markets; this supports both the public and private sectors when arranging necessary capital for large-scale projects such as P3s (Amponsah and Forbes 2012). Further, stable macroeconomic conditions within a jurisdiction enable financial transactions and private investments (Ahmadabadi and Heravi 2019; Zou et al. 2014). The private sector also tends to look for government guarantees or enhancements (i.e., subsidies or tax reductions) to support private investment for infrastructure development via P3s (Shi et al. 2016a).

C. Public Sector Capacity

Public sector capacity is another category of CSFs that underscores public sector expertise, experience and support in P3s. A capable and experienced public agency is noted as essential for P3 planning and implementation; in particular, public sector leadership, and an organized and committed public agency are important elements (Garvin and Bosso 2008; Hwang et al. 2013; Jacobson and Ok 2008). Indeed, the other CSFs in this category depend on the strength and experience of the public agency responsible for P3s, and some literature has emphasized the importance of a dedicated P3 unit (Geddes and Wagner 2013). In general, the public sector leads a project's stakeholder management efforts; these efforts dictate how well stakeholder concerns are addressed. The CSF literature identifies "managing stakeholders with

social responsibilities", "assessing the stakeholders' needs and constraints to the project", and "communicating with stakeholders properly and frequently" as principal requirements (Jacobson and Ok 2008; Mladenovic et al. 2013). Stakeholder management and engagement processes determine how project information is disseminated to citizen and society groups and the means of communication such open forums, public hearings, and other input and feedback channels (El-Gohary et al. 2006a). Finally, the provision of guarantees (or other types of financial enhancements such as credit assistance) by the public sector is a signal of its experience (and its commitment); their provision can further leverage and increase private equity involvement (Osei-Kyei and Chan 2017b; Tang et al. 2013)

D. Effective Procurement

The procurement process followed, and its effectiveness is frequently stressed in the CSF literature. Authors have stressed the importance of appropriate and competitive criteria for the tendering/bidding process viewed as CSFs to initiate the project procurement. The transparency and competitiveness of procurement is further highlighted since fair and credible tendering processes positively promote public interests (Tiong et al. 1992; Simon et al; Zhang 2005b. 2020). The level of competition reflects robust and growing market interest among private developers in the P3 infrastructure sector (Jefferies et al. 2002; Liu et al. 2016b); whereas a lack of competition can lead to circumstances in which sub-optimal solutions are chosen (Mota and Moreira 2015; Ng et al. 2012a). The outcome of the procurement process is also critical for project success. For example, bidding firms' capabilities of fulfilling contractual requirements reflects the importance of having strong private consortia participating in the market (Cheung et al. 2012b; Jefferies et al. 2002; Liang and Jia 2018). Another highly empathized CSF is the equitable allocation of risks between public and private sectors; the allocation of risks and their mitigation strategies among the stakeholders will have significant impacts on project implementation and service delivery (Ahmadabadi and Heravi 2019; Grimsey and Lewis 2002; Olusola Babatunde et al. 2012).

E. Project Execution and Outcomes

The factors in the project execution and outcomes category include potential advantages and considerations of P3 delivery; the advantages reinforce P3s as a viable delivery strategy while the considerations are important for continuous improvement. A well-cited advantage of

P3s is accelerating project delivery (Abdel Aziz 2007; Garvin and Bosso 2008; Li et al. 2005; Osei-Kyei and Chan 2015). This is not in the sense of completing a project ahead of schedule; rather, it is delivering identified requirements or scope sooner in time through a P3 compared to a conventional delivery. Another advantage are the efficiencies gained as assets and services are produced (Ahmadabadi and Heravi 2019a; Liu et al. 2015a). Finally, the extent to which P3s promote local economic development is also significant since employment opportunities and complementary economic development are important potential benefits (Mladenovic et al. 2013; Opawole et al. 2019). In terms of considerations, user satisfaction is highlighted; users are the most direct beneficiaries of a new facility, so the extent to which the facility meets their needs or expectations drive its usage and their willingness to pay for its services (Jefferies et al. 2002; Opawole et al. 2019).

Eventually the project operation and facility management expenses depend on the revenue which are collected through toll, therefore user satisfaction is crucial for the success of the project (Almarri and Boussabaine 2014). Researchers agree on the objectivity of P3 projects as to promote local economic development, which is related to job growth, urbanization etc. It is imperative to understand that project performance solely rely on attractiveness to the users to use the facility. Researchers tied user fees as critical for project success. They suggested the implication or toll rate may influence project success negatively.

F. Lifecycle Perspectives

The last category of factors includes CSF studies that took lifecycle perspectives of P3s to consider the linkage between project phases and P3 success. For instance, Liu et al. (2015b) and Liu et al. (2015c) emphasize the importance of managing the various relationships in the project initiation and planning stage, so effective interface management in P3 initiation and planning is an important factor. Similarly, the importance of effective interface management in procurement, construction, and operations is another driver of project success. Osei-Kyei and Chan (2018a) developed a success index model that consists of 15 critical success factors; the top two factors were acceptable quality of the project and meeting output specifications.

2.4.2 Key Performance Indicators (KPIs)

Unlike CSFs that identify factors that likely contribute toward success, key performance indicators (KPIs) are typically more specific metrics or milestones of performance. KPIs

typically differ from project to project, depending on an enterprises or agency's strategic priorities and goals. In the literature, KPIs have received less attention than CSFs. Extant literature emphasizes KPIs are indicative of the efficiency and effectiveness of the projects and their outcomes. Arguably, a project's performance largely depends on process improvement, adherence to performance management, and the use of KPIs to assess the outcomes. This review identified 16 primary P3 KPIs. Similar to CSFs, Table 2-5 depicts the KPIs found in the literature as well as the frequency of their mention in the 11 papers selected. Following similar content analysis techniques employed for the CSFs, the KPIs are grouped into 4 major categories: (1) project delivery KPIs, (2) financial KPIs, (3) operations KPIs, and (4) socio-economic KPIs, as illustrated in Table 2-6.

Table 2-5 Frequency of KPIs in the selected literature

Key Performance Indicators	(Almarri and Boussabaine 2017c)	(Lima and Cruz 2016)	(Liu et al. 2015a)	(Liu et al. 2016a)*	(Mladenovic et al. 2013a)	(Mohamad et al. 2018)	(Molenaar and Navarro 2011)	(Okudan et al. 2020)*	(Osei-Kyei and Chan 2018b)	(Yuan et al. 2012a)	(Yuan et al. 2009a)
Design quality					✓		✓			✓	✓
Construction quality	✓	✓			✓	✓	✓			✓	✓
Project specific interim milestones		✓			✓	✓	✓				✓
Health & safety record	✓	✓								✓	
Asset delivered on time and quality and with no additional cost		✓			✓	✓			✓	✓	
User fees structure/schedule					✓						
Ability to fully cover debt service costs, contract costs	✓	✓								✓	
Annual Average Daily Traffic (AADT)		✓								✓	
Annual revenues from tolls, concession, and other funding sources		✓			✓					✓	
Indicator of congestion		✓								✓	
Results of benchmarking and value testing (without increase in cost)		✓									
Operations and maintenance cost		✓	✓		✓	✓				✓	✓
Perform OHS management (compliances)		✓	✓						✓		
Results of performance audits (stipulated from contract)		✓					✓		✓	✓	
Average rectification periods		✓					✓		✓		
Local socio- economic development	✓						✓		✓		

* These two articles are “normative” in nature, primarily discussed the need for and importance of using success factors.

A. Project Delivery KPIs

The project delivery KPIs capture indicators related to project execution and management. In general, these KPIs evaluate implementation performance using quantitative metrics. For example, many studies proposed indicators of (1) meeting project specific interim milestones, (2) design quality, and (3) construction quality (Chasey et al. 2012a; Lima and Cruz 2019). In addition, meeting output specifications of a P3 project is significant for project implementation (Grimsey and Lewis 2005; Raisbeck et al. 2010).

B. Financial KPIs

The financial KPIs help capture how well a project performs in terms of revenue, profit generation and debt service coverage. Monitoring financial KPIs reveals whether the project is meeting its short-term and long-term financial obligations. These are very important aspects of P3 performance. Some indicators in this group are leading indicators such as average annual daily traffic (AADT) and user fee structure or schedules; the user fees and number of users have a direct impact on revenue generation (Mohamad et al. 2018;Yang et al. 2009). Others consider direct financial metrics that relate to ability to cover debt service or recoup investment (Kurniawan et al. 2015).

Table 2-6 KPIs in the existing P3 literature

Groups	Key Performance Indicators	References
Project delivery KPIs	Design quality	(Yuan et al. 2009a); (Mladenovic et al. 2013a)
	Construction quality	(Almarri and Boussabaine 2017c) (Yuan et al. 2012a)
	Project specific interim milestones	(Mohamad et al. 2018); (Yuan et al. 2009a)
	Meeting output specification	(Yuan et al. 2012a)
	Asset delivered on time and quality	(Mladenovic et al. 2013a); (Yuan et al. 2012a))
Financial KPIs	User fee structure/schedule	(Mladenovic et al. 2013a)
	Ability to fully cover debt service costs, transaction costs	(Almarri and Boussabaine 2017c); (Lima and Cruz 2016)
	Annual Average Daily Traffic (AADT)	(Lima and Cruz 2016); (Yuan et al. 2012a)
	Annual revenues from tolls, concession, and other funding sources	(Mladenovic et al. 2013a); (Yuan et al. 2012a)
Operational KPIs	Congestion indices or other service level metrics	(Lima and Cruz 2016)
	Results of benchmarking and value testing (without increase in cost)	(Lima and Cruz 2016); (Yuan et al. 2012a)
	Operations and maintenance cost	(Lima and Cruz 2016); (Yuan et al. 2012a)
	Compliance with Occupational Health and Safety (OHS) requirements	(Lima and Cruz 2016); (Osei-Kyei and Chan 2018b)
	Results of performance audits (stipulated by contract)	(Lima and Cruz 2016); (Osei-Kyei and Chan 2018b)
	Average rectification or remedy periods	(Lima and Cruz 2016); (Molenaar and Navarro 2011)
Socio economic KPI	Local socio- economic development	(Almarri and Boussabaine 2017c); (Molenaar and Navarro 2011)

C. Operations KPIs

Operational KPIs are metrics of operations and maintenance activities performed in the operations period, the longest phase in a typical P3 project. Two important KPIs viewed as crucial in this category are (1) improving trip time reliability (i.e., increase in speed, congestion condition improvement) and (2) increasing safety (i.e., accident reduction, incident response time) while using the highway (Lima and Cruz 2016; Mladenovic et al. 2013). Many KPIs in this category also capture asset management perspectives. For example, operations and maintenance cost, (2) results of performance audits (stipulated by the contract), (3) average rectification periods (time to correct deficiencies in service or condition

criteria) are indicative of effective asset management and operation. These KPIs are an integral component to maintain expected service levels (Lima and Cruz 2016; Yuan et al. 2012). It is worth noting that limited research has focused on identifying and reporting on operations KPIs.

D. Socio-Economic KPIs

Socio-economic KPIs capture the social impacts and value creation that results from project development. For instance, citizen/user's satisfaction with the infrastructure or service is pointed as an important indicator (Yuan et al. 2010). Other expected outcomes include creating jobs or stimulating commercial activities. Therefore, promoting local economic development from P3s is another important outcome (Almarri and Boussabaine 2017c); (Molenaar and Navarro 2011). Over time, highway agencies implementing P3s have continuously increased expectations and social goals both for the public and users.

2.5 Identification of Gap(s)

The current literature on P3 CSFs, although providing important insights, has a few key limitations. First, CSF literature is fragmented among several research streams, such as conceptual frameworks, stakeholder management, risk management, financial viabilities and procurement and broader categories such as political, social, and economic CSFs; therefore, CSFs studies need synthesis and greater coherence to provide a complete picture of the factors that need consideration in P3 implementation. Besides, many are descriptive reviews and fail to prioritize the relative importance of various success factors – given the wide spectrum and coverage of studies (various countries, sectors, stages, or project model) on CSFs. Second, relationships among CSFs are not easily identified, which makes it difficult for stakeholders to have a better understanding of the influence/impact of the various CSFs. If such relationships were better understood, their value for assessing P3 performance would certainly increase. Finally, existing CSF performance studies tend to emphasize their advantages or applications in practice while ignoring the influence of CSFs on P3 success/performance. More specifically, attention has been given to achieve specific CSFs but studies examining whether such factors lead to "positive" or "negative" P3 performance are scarce.

KPIs found in the literature tend to focus on specific phases. In particular, the operations phase is emphasized where metrics related to service quality or asset management have been proposed, i.e., the latter phases of a P3 project's lifecycle. Such KPIs are

challenging to develop since they need to be adaptable over the long-term duration of project contracts as technologies and expectations change. Certainly, developing KPIs that can represent the lifecycle performance of P3s is challenging, and the work to date has generally not attempted to do so.

2.6 Proposed CSF-KPI Framework for P3s

The implementation of a P3 is a complex process that involves multiple phases. Each phase has specific activities and goals (Liu et al. 2015d). Moreover, the outcomes of a particular phase influence subsequent phases. Hence, CSFs and KPIs well-suited to support assessing the performance of the individual phases. Further, they can enable examining the interdependency among all phases of a P3.

The conceptual relationship shown in Figure 2.2 is a representation of various factors and indicators necessary to examine performance and serves as the basis for the development of a CSF-KPI framework, shown in Figure 2.2. The components of the framework consist of four groups of CSFs and four groups of KPIs. The CSF groups include project environment factors such as legislative provisions that support P3 projects, and preparation factors that capture the key activities that shape a project's development until procurement starts. Procurement process factors describe the procedures to develop and procure P3 services while socioeconomic factors are indicative of economic progress (such as job creation and commercial activities) and social impact (benefits of a project to society). Similarly, several groups of KPIs are proposed to gauge project outcomes once a project moves into implementation and operations. Process indicators assess aspects of the procurement process. Implementation indicators track how project delivery and management proceed while financial indicators serve to monitor financial parameters during implementation and service delivery phases. Lastly, operational indicators monitor the levels of service and management in the operation phase.

The phases of a typical P3 arrangement are categorized into three groups: (1) project preparation (inclusive of a project's enabling environment and shaping phase), (2) project partnerships (inclusive of a project's procurement and contracting phases), and (3) project execution (inclusive of a project's implementation and service delivery phases).

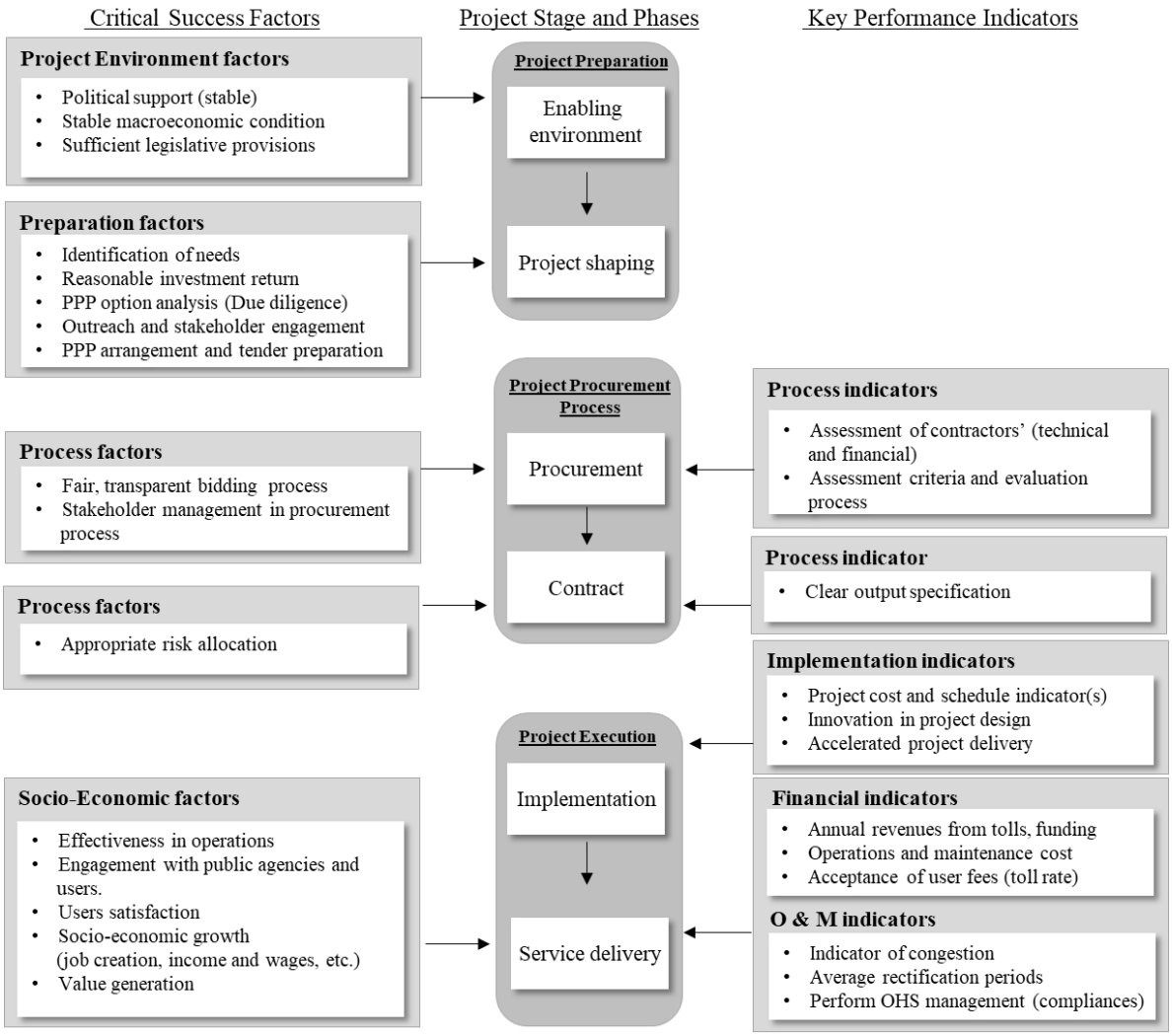


Figure 2.2 CSF-KPI framework to gauge P3 performance in project phases and over its lifecycle

2.6.1 Project Preparation

In the enabling environment, the major objectives are to establish: (a) rules and regulations that authorize P3 arrangements; (b) the extent that the public sector has agency to initiate P3 programs; and (c) how P3 processes can be implemented. A sound legal framework grants the necessary statutory authority to deliver projects as P3s. Therefore, favorable legislation and regulations will encourage local or international investors to partner with governments for project development (Hodge et al. 2018; Hodge and Greve 2011). A stable macroeconomic environment is important to reduce the risks the private sector is interested undertake (Liu et al. 2015d). Sufficient access to financial markets supports low financing costs and favorable lending arrangements, which helps both the public and private sectors. If macroeconomic conditions are stable or improving, the public sector's ability to attract financing from the private sector increases (Menendez 1998). Perceived political risks

due to unstable political support in P3s may jeopardize them. Therefore, consistency of policies and government priorities create political stability which can promote P3 success.

The project shaping phase involves activities to configure the technical, economic, legal, and social characteristics of a P3 project, so it has a feasible business case and a sufficient risk assessment. Therefore, identification of needs and selecting the right project should be done in light of current infrastructure conditions (Jefferies 2006a). P3s work best where there are long term predictable needs for infrastructure. Project objectives must be realistic and provide enough articulation and justification of the technical, economic, social, fiscal, and programmatic drivers of the project (Liyanage and Villalba-Romero 2015). In making this determination, governments should consider which procurement options (i.e., delivery methods) bring the best value for the project. These criteria include, but are not limited to, the scale of the project, predictable long-term need, transaction costs, implementation complexity, and measurable output criteria. Therefore, a thorough due diligence process is necessary and critical to success (Ng et al. 2012). Procurement options analysis can reveal expected capital requirements, operation costs, and principal risks as well as the bankability of a project; private investors typically do not consider a project unless reasonable investment returns are anticipated (Abdel Aziz 2007; Istrate and Puentes 2011).

Effective P3s incorporate a stakeholder management strategy to consider stakeholder input and concerns. Transparent communication (i.e., clear and credible information) can resolve problems quickly and improve long-term relationships and confidence (El-Gohary et al. 2006b; Nederhand and Klijn 2019b). Therefore, outreach and stakeholder engagement are critical factors in P3s. Once a P3 approach is selected for a project, tender preparation identifies and delineates clear requirements, so the tendering process can be initiated. Environmental permitting, other necessary approvals, and third-party coordination requirements also need to be identified so progress can be made toward completion. These are prerequisites for developing a procurement plan and process (Tang et al. 2014).

2.6.2 Project Partnerships

Effective P3 procurements are typically viewed as fair, transparent, and competitive (Garvin and Bosso 2008; Yang et al. 2009). Normally, P3 procurements involve multiple stages – solicitation, prequalification, proposal submission, proposal evaluation, preferred bidder selection, commercial, and financial close. However, in some cases governments rely on unsolicited proposals assuming the proposal received is innovative and cost-effective.

Plans to keep interested and impacted stakeholders engaged should continue during the procurement process – although public agencies must preserve the confidentiality of sensitive commercial information when feasible. Consequently, the development and use of standardized documents, together with clear procurement policies and guidelines, create a common framework supporting P3 transactions (Liu et al. 2016c).

For the process indicators, multiple aspects of a procurement process such as RFQ (Request for Qualifications), RFP (Request for Proposal), negotiation, award, and financial close need both qualitative and quantitative assessment. Then, the evaluation criteria (such as price, design, schedule, qualification or quality and rating system pass/fail, scoring system award algorithms, etc.) are quantitative indicators to establish competitiveness in the bidding and selection process (Abdel Aziz 2007). Thus, these processes indicators provide insights about the technical and financial aspects of procurement along information about assessment criteria and evaluation process. Further, the process indicators are indicative of its efficiency and reduces risk of changes in the overall environment over time.

Appropriate risk allocation and risk-sharing are fundamental components of P3 arrangements. Risks should be allocated to the party best able to manage and control it (Nguyen et al. 2018a). In all cases, government should ensure that risk exposure is managed instead of leaving it open to the private sector. Also, before committing to the projects, participants in the private sector should fully understand the risks involved, pricing and proper management of the risks (Hwang et al. 2013a). The contract between the parties (public and private) guides the standards and specifications. These output specifications should be clear, understandable, and measurable. Unclear and ambiguous specifications not only hamper the project progress but also create confusion and conflict among public and private parties (Jefferies et al. 2002a; Lam and Javed 2015)

2.6.3 Project Execution

Project execution consists of project implementation and service delivery activities. The key components of the implementation phase are to assess "time" and "cost" performance. Contract obligations and requirements support accelerated project delivery which not only indicates on-time completion but also process integration, reduce environmental impacts, and lowered capital and operating costs, etc. (Garvin et al. 2011). Both public and private sectors should establish clear procedures for project management and efficient ways to track project progress and anticipate or resolve potential problems. Therefore, cost and schedule indicators are essential in the implementation phase.

Unlike conventional projects, P3s include operations within their scope of work. Consequently, accurate analysis of the factors influencing the operational performance is an important task. In the service delivery phase, the longest stage of P3 projects, many obligations exist such as meeting service standards and effective and efficient asset management (EPEC 2018). This phase includes financial, operational, and socio-economic indicators as depicted in Figure 2.2. These support the assessment of the “business success” of P3s – how well the enterprise created fared functionally and financially. In addition, the future potential of a P3 can be gauged based on its potential to catalyze new markets, socio-economic growth, and job creation (Mota and Moreira 2015; Rohman et al. 2017).

2.7 Study Limitations

It is important to acknowledge the limitations of the study. This framework development does not represent a comprehensive in-depth map of all CSFs and KPIs across P3 projects but critical key parameters. Because the development of P3 projects across the globe is unique, contexts are different, and requirements are dissimilar. Therefore, it is not pragmatic to capture all these contexts to develop CSFs and KPIs. This study highlights a common set of factors that influence most P3 projects as well as indicators of outcomes for transportation projects; projects in other sectors would have a need to assess outcomes but require a different set of indicators .

2.8 Future Research Directions

The identified CSFs and KPIs and CSFs and KPIs can serve as an essential element for the purpose of assessing P3 performance. There is certainly scope for future research to focus on how the CSF-KPI framework can be used to develop more tangible and pragmatic methods for evaluating P3s by considering the perspectives of key stakeholders and how

factors in particular can be translated into indicators. For instance, identifying proxy indicators for factors such as “sufficient legislative provisions”, P3 determination indicators, market interest, etc.

Besides, KPIs is the tool to measure those desired and tangible performance set forth by the stakeholders. Furthermore, it was difficult to forecast any possible changes in a P3 contract in the situation of adding capacity, changes in the law, or functional requirements for a long concessionaire period of about 20-30 years. There are numerous and very complex KPIs that were difficult to implement and subjectivity in output specifications which lead to various interpretations, unclear risk allocation, and problems in change negotiations. The research could potentially aim to investigate to define and characterize these KPIs more robust with less subjectivity to ensure the best practices for implementing P3 infrastructure projects, future work should concentrate on analytic evaluation to validate the existing CSFs correlated with project management performance.

2.9 Conclusion

CSFs and KPIs can play a major role to assess and evaluate P3 project performance. While the literature reviewed indicates that CSFs and KPIs are somewhat varied in their scope and focus, their purpose is the same: to support assessing the effectiveness, efficiency, and productivity of P3s.

The literature review revealed that researchers have set forth CSFs and KPIs related to P3 performance across the various phases of a project. CSFs found in the literature were grouped into categories of project environment and planning; economic and market conditions; public sector capacity; effective procurement; and lifecycle perspectives. For KPIs identified, four groups were established: technical KPIs, operational KPIs, financial KPIs, and socio-economic KPIs.

The synthesizing of this literature generated the CSF-KPI framework presented. The CSF-KPI framework considers factors and indicators related to the phases of a P3 project; it associates the relevant CSFs and KPIs with respect to these phases and thereby provides a comprehensive perspective of the relationship between these factors and indicators and P3 outcomes and performance. The framework developed can act as a guideline that can identify key areas for performance criteria in the different life-cycle phases of P3 projects. Accordingly, this study enables a holistic view of these projects for public and private sector stakeholders interested in P3 project performance.

Chapter 3 Development of a Framework to Assess Key Stakeholders' Interests and Levels of Performance in Public Private Partnership Highway Projects

Abstract

A P3 project is likely be viewed as fruitful if the key interests and objectives of all stakeholders are fulfilled. Consequently, the level of stakeholder satisfaction ought to be a reliable measure of P3 outcomes. Scholars and practitioners have recognized the importance of managing the interests and expectations of project stakeholders; however, a thorough understanding of stakeholder interests and expectations across project phases and linking these interests and expectations with performance assessment are missing. Addressing stakeholder interests and developing an approach to capture how well these interests are satisfied can indicate how P3s have performed across various phases. This study proposes a framework that assesses the extent that stakeholder interests are served and links these interests with performance dimensions such as P3 suitability and risk management. These performance dimensions are further associated with four levels of performance: planning, project management, business, and future potential. Subsequently, the framework is applied to the I-495 Capital Beltway Express project in Virginia to illustrate and substantiate it. The framework is normative and establishes a starting point (or baseline) to gauge fulfillment of key stakeholder interests in P3s, which is indicative of P3 performance.

Key words: Public Private Partnerships, P3s, Stakeholder Interest, Performance, Highways, Framework, I-495.

3.1 Introduction

Over the last couple of decades, Public-Private Partnerships (P3s) have been recognized as a viable alternative for procuring and developing public infrastructure. P3s potentially bring together the best of private sector expertise, ability, and interests and public sector regulatory and supervisory capacity to develop public infrastructure. P3 projects involve a variety of stakeholders (in both the public and private sectors) in different stages, and their varying interests and expectations are multi-faceted. Given the complex nature of P3s, well-structured means of identifying and capturing these stakeholders' interests and expectations are limited; these interests are likely varied throughout a project's life cycle and eventually dictate P3 performance. Scholars and authors have recognized the importance of managing the interests and needs of project stakeholders – inclusive of those directly involved in P3s and those impacted by P3s. Research has asserted that recognizing stakeholder interests and expectations contributes to P3 success since doing so highlights their influence and participation in P3 development (Mladenovic et al. 2013b; De Schepper et al. 2014).

Second, what constitutes "success" for a P3 project depends on each stakeholder's perspective; the stakeholders of a project have varying interests arising from different objectives over the various stages of a project (i.e., the project lifecycle). Therefore, a definition of "success" for P3s is not simple to articulate. The stakeholders involved – legislative units, public agencies, users, impacted citizens, private investors, and private service providers – have various objectives and goals associated with P3 developments as well as changing levels of influence (South et al. 2015). Consequently, identifying the common ground of P3 success and capturing the key interests, objectives, and expectations of different stakeholders are starting points for assessing P3 performance.

With this backdrop, this work focuses on two objectives. The first objective is to identify the interests and expectations of key stakeholders over a P3's project lifecycle. The second objective is to develop a normative approach to assess the extent that stakeholder interests are met; doing so provides an indication of levels of performance for P3s as they are planned and implemented. Moreover, such a comprehensive approach can shift the discourse about P3 performance away from rhetoric and anecdotes toward meaningful evidence. The framework provides a basis for gauging whether a P3 has fulfilled fundamental stakeholder interests.

3.2 Capturing Stakeholders' Interests in P3s

Stakeholders in P3s include the entities that initiate, plan, and implement these arrangements and those that are interested in or impacted by them. Obviously, the stakeholders responsible for a P3 project have significant influence over it, but increasingly interested or impacted stakeholders are viewed as having necessary and productive roles in their development (Nederhand and Klijn 2016). Consequently, the outcomes of P3s are dependent on whether the various interests of stakeholders are met or not.

Researchers have utilized different methods to incorporate stakeholder perspectives in P3 research. Grimsey and Lewis (2002) examined risks in P3 projects by considering the risk perspectives and key metrics for a project's procurer, sponsor, and senior lenders (essentially the public agency and the two private investors in P3s). Based on a case study, they concluded that the procurer was most concerned about the present value of expected payments made in the contract, the sponsor was focused on the equity return and the senior lenders concentrated on the project's various debt service coverage ratios. Garvin and Bosso (2008) proposed the P3 equilibrium framework that captures social, industry, state, and market interests. This approach considers how P3s balance the interests among stakeholders, under the premise that actions within a project may balance the interests of these stakeholders or may meet the interests of one of these stakeholders more than the others; however, the overall effectiveness of a P3 project depends on an "equilibrium" of interests among the parties. P3 cases illustrated those projects in disequilibrium such as the I-895 Bypass in Virginia tended to have issues.

In another study, Jooste et al. (2009) developed a P3 governance framework comprised of three stakeholder groups – the public sector, the private sector, and the civic sector – to address building capacity, increasing legitimacy, and balancing interests. The study presents a list of actions to be taken for the success of the P3 program and demonstrates that each of these actions is in line with the proposed P3 framework. Subsequently, the study illustrated the relationships of these aspects with respect to each of the three stakeholder groups. Based on the importance of the critical success factors (CSFs) of PPP project management success, Liu et al. (2015) proposed a life-cycle CSF framework which explains the various factors that are critical to successfully implement a P3. The conceptual framework considers critical success factors, roles of public sector, concessionaire selection, risk management, cost and time issues, and finance and proposes a lifecycle conceptual

framework. This basis of the conceptual model is based on Neely et al. (2001), the "Performance Prism" concept.

Similarly, Nederhand and Klijn (2016) analyzed how factors such as veto power, contracts, and trust impact the involvement of citizen and societal stakeholders in P3s and their capacity to positively influence project outcomes and performance. They pointed out that involving such stakeholders tended to promote innovation features in projects rather than better overall performance in projects. Hodge and Greve (2017) proposed a conceptual model with five levels of P3 assessment: project, delivery, policy, governance, and context and culture. Their framework suggested goals for each level, so outcomes of P3s could be assessed at each level. Moreover, they contended that contrary to some claims and rhetoric that "we know very little about the performance of [long-term infrastructure contract] P3s – even at the most elementary levels."

In general, researchers do agree that the spectrum of stakeholders in a P3 project is complex because of their diverse interests and expectations, the extent of their involvement, and contextual factors associated with their jurisdiction. However, extant studies have two main limitations: (1) Studies emphasize the importance stakeholder(s) interests but did not the relate stakeholders' interest from various phases in P3s, and (2) How the key stakeholders performance assessment can be assessed. To bridge the gap, this study develops a normative approach to capture key stakeholders' interests and expectations with respect to different project phases; subsequently, indicators of interests and expectations are derived to examine the extent to which key stakeholders' interests and expectations are met throughout the project lifecycle. Consequently, the approach establishes a starting point (or baseline) to gauge fulfillment of key stakeholder interests in P3s. To demonstrate and substantiate the framework, it is applied to the I-495 P3 project (Capital Beltway Express) in Virginia.

3.3 Methodology to Assess Stakeholder Interests and P3 Performance

3.3.1 Developing the Framework to Assess Stakeholder Interests and Levels of Performance

Figure 3.1 illustrates the methodology followed to develop the framework to assess stakeholder interests and levels of performance in P3s. A central component of the approach is assessing stakeholder interests, so the principal focus of the methodology is to determine key stakeholder interests and to identify indicators that support assessing the extent to which stakeholder interests are met. Consequently, key stakeholders were identified first, which

addresses an important question raised in the P3 literature – "performance for whom?" (Hodge and Greve 2017); moreover, including multiple P3 stakeholders increase the comprehensiveness of the framework. Next, the overall context of the assessment was defined by articulating the setting and phases of a project for consideration in the framework; adopting a lifecycle perspective furthers the goal of comprehensiveness. Subsequently, the interests and expectations of the key stakeholders in a project's setting and phases were derived from the normative literature on P3s that has examined critical success factors (CSFs), key performance indicators (KPIs) and, more broadly, P3 performance (Mladenovic et al. 2013a; Zhang 2005c). This was an iterative process where CSFs and/or KPIs relevant to a project's setting or phase were pinpointed and synthesized with the P3 performance literature to associate factors or indicators with corresponding stakeholder interests; in most instances, this association was clear, but in some instance interpretation and judgment were necessary. This process naturally supported the next step to identify representative indicators of the fulfillment of stakeholder interests and expectations. This step also included developing interpretation conditions to determine the extent that stakeholders' interests were met. Once completed, the method for assessing stakeholder interests was developed and denoted as the "P3 stakeholder assessment register".

Next, sets of interests and their indicators were grouped into performance dimensions that capture key aspects of a P3 project's development over its lifecycle; this aggregation supports an overall assessment of P3s by these dimensions. Finally, the performance dimensions were linked with four levels of performance: planning, project management, business, and future potential; these four levels follow a model developed by Dalcher (2009) to move beyond the conventional project success measures of cost, time and quality. Considering the level of performance in these four areas for P3s provides a holistic view of a project.

Subsequently, the framework was applied to the I-495 Capital Beltway Express P3 in Virginia; details about this project are described subsequently. Data about the I-495 P3 was collected from governmental documents or records, project documents, third-party reports or articles, and academic reports or articles. This data was organized and linked to the relevant elements of the P3 stakeholder assessment register. The register was completed by two researchers to needed to reach agreement on the extent of fulfillment of stakeholder interests; the details of this process are described subsequently.

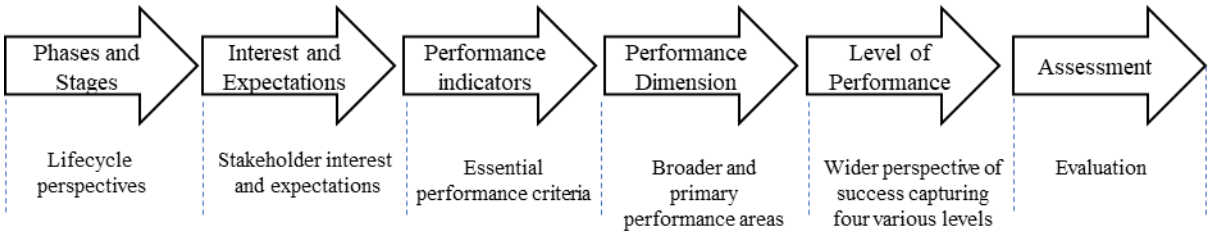


Figure 3.1 Overview of methodology to develop framework

A. Stakeholder Identification

As mentioned earlier, the spectrum of stakeholders in a P3 project is complex because of their varied interests, degree of involvement, and underlying incentives. While selecting stakeholders, we examine their level of direct involvement in P3 projects, their contribution to decision making, and their influence on P3 outcomes. Building primarily from (Garvin and Bosso 2008) and to some extent South et al. (2015), four major stakeholders – the State, Investors, Producers and Citizens & Users – are identified based on each's active involvement and potential level of impact as illustrated in Figure 3.2 Each is defined below:

State: Elected bodies and executive agencies that represent and govern the general public; in the context of this work, the state is most often associated with the public agency responsible for planning, implementing and managing infrastructure programs and projects such as P3s.

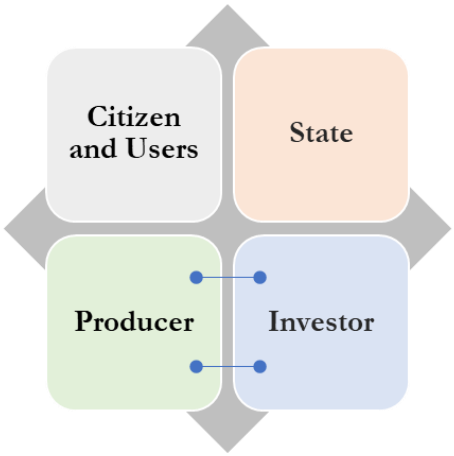


Figure 3.2 Four major stakeholders

Investor: The investor contribute equity to a project and is responsible for raising the balance of the funds needed to develop the asset, except to the extent that the government provides part of the capital or operating funds. The investor may be a single entity or collection of entities. The investors are also typically the owners of the special purpose vehicle (SPV) established for a P3 project through their equity stake; the investor typically engages lenders to provide additional capital, but their interests can differ somewhat.

Producer: Producers are the firms or enterprises who provide the services necessary to design, build, operate and maintain the asset/facility. They usually consist of both local and international developers, contractors, operators, suppliers, and consultants.

Citizens and Users: Many individuals, groups or organizations from the general public can be involved and impacted by P3s including: (1) local taxpayers and business owners; (2) non-profit organizations, non-governmental organizations (NGOs), social movement organizations and community groups; and (3) potential users of the developed facility (Jooste et al. 2009).

B. P3 Setting and Phases

P3 projects occur in particular settings and involve different phases; these are identified to organize and characterize the activities and interests of the four key stakeholders throughout the lifecycle of P3 projects. The setting for a P3 is captured by its Enabling Environment while the phases are: (1) Project Shaping, (2) Procurement, (3) Contracting, (4) Implementation, and (5) Service Delivery.

3.3.2 Development of the P3 stakeholder Interests Register

The first step in the development of the P3 stakeholder interests register was identification of stakeholder interests. Within each setting or phase, stakeholder interests were derived from the CSF and KPI literature as well as the broader P3 performance literature. This involved considering the relevance of specific CSFs, KPIs, or other performance factors to each of the four stakeholders and pinpointing their principal interests in the setting or phase. Subsequently, indicators of these interests were identified; again, the literature guided this process. The next step was to develop conditions to interpret the indicators to determine the extent to which stakeholder interests were met with either binary or discrete sets of "not met", "partially met", or "fully met". Table 3-1 depicts the resulting "P3 stakeholder interests register". The sections that follow illustrate the process followed to generate the register for a P3's "Enabling Environment"; a description for the remaining phases in Table 3-1 is not included for the sake of brevity.

Table 3-1 P3 Stakeholders Interests Register

Stages/Phases	Stakeholder	Key interests	Performance indicators	Interpretation	Not Met	Partially Met	Fully Met	Sources
Enabling Environment	State	Enabling legislation supports P3 project delivery	• Types and number of projects authorized. • Solicited and unsolicited proposals permitted. • Funding sources authorized	• Broad: no restrictions on number or types of projects; solicited and unsolicited allowed; no or limited restrictions on use of public funds • Limited: restrictions on number or types of projects; unsolicited proposals are not authorized; restrictions on public funds –or- project-specific legislation	Limited	X	Broad	Geddes and Wagner (2013); Albalate et al. (2020)
	Investor & Producer	Socio-political stability that limits risks	Legislative or executive oversight process defined	• Evaluation and approval process published and readily available	No guidelines published or process not established	Process established but not fully documented	Guidelines published	Jeffares et al. (2013); (Zhang 2005a);Osei-Kyei and Chan (2018)
			Legislation or executive guidelines define any stakeholder engagement requirements	• Non-NEPA public engagement required by enabling legislation or agency guidelines are known	Non-NEPA engagements not defined	X	Non-NEPA engagements defined	
			Limited opportunity for "last minute" modification or termination of a project by legislative action	• Established evaluation and approval process does not require project-specific legislative approvals	Legislative approval required	Legislative involvement but not strict approval	Legislative approvals not required	
		Favorable investment environment	Record of transactions and private investment in transportation projects • Number of prior P3 projects • Private equity and debt in prior projects	Greater number of projects with private equity invested and innovative financing instruments illustrates experience with such arrangements	No prior projects	1-2 projects but private equity invested and/or innovative instruments used	3+ projects with private equity invested and innovative instruments	Osei-Kyei and Chan (2015); Osei-Kyei and Chan (2017a)
			Creditworthiness of owner	• Fitch/Moody's/S&P Issuer Rating where higher indicative of agency/state capacity to meet financial obligations pledged to P3 projects and lower the opposite.	C-level rating	B-level rating	A-level rating	
			Types of governmental instruments or programs available to support private investment	In US: • TIFIA program • PABs authorized	Not available	TIFIA or PABs available	TIFIA and PABs available	
	User/ Citizen	Checks & balances in development process	Process for accepting/approving projects as P3 is defined and historically followed	• Process is published and readily available	No process published or established	Process established but not fully documented	Process published	(Liu et al. 2015e);(Liu et al. 2015d)
			Mandated opportunities for citizen/community input and engagement	• Enabling legislation or agency guidelines include mandated public engagement requirements	No mandated engagement	Limited mandated engagement	Mandated engagements throughout process	
Project shaping	State	Clear need for project	Project in long term transportation plan	• Yes: project in LT or ST plan indicative of need • No: indicative that not a previously identified need	No	X	Yes	Qiao et al. (2002), Jefferies et al. (2002)
			Project in published pipeline	• Yes: illustrates need and signals such to interested stakeholders • No: not in pipeline or agency does not publish pipeline so not indicative of need or signaling	No	X	Yes	
			Transportation conditions • LOS/congestion • Safety • Etc.	• Degrading or poor current conditions indicative of need: poor or declining levels of service, safety, etc.	Conditions stable	X	Conditions declining	

Stages/Phases	Stakeholder	Key interests	Performance indicators	Interpretation	Not Met	Partially Met	Fully Met	Sources
	Investor	Due diligence to determine P3 suitability	P3 value drivers considered: • Risk transfer • Accelerated delivery. • Private efficiencies	• Qualitative factor(s) identified by public agency as rationale for P3	Qualitative considerations not explicitly identified or documented	X	Quality considerations explicitly identified and documented	Zhang (2005), Almarri and Boussabaine (2017a); Yuan et al. (2012); Ng et al. (2012)
			Planning/feasibility studies	• Types of studies completed and published indicate quality and depth of feasibility assessment	No planning (i.e. MIS, MPS), design (i.e. PD&E) or economic (i.e. CBA) studies completed	Some studies completed	Full complement of studies completed	
			T&R studies	• Completed studies and source indicative of demand/revenue potential. • Source indicative of potential for optimism bias	No T&R studies	Self-performed T&R study completed	Periodic third-party T&R studies completed	
			Business Case and/or VfM analysis	• Yes: Completed and published ex-ante and/or ex-post studies indicative of P3 suitability • No: Ex-ante and/or ex-post studies not completed	No BCA or V*f*M completed	BCA or V*f*M completed	BCA completed and ex-ante and ex-post V*f*M completed	
		Stakeholder Management	Stakeholder engagement strategy • Non-mandatory engagement • Citizen advisory committees, etc.	• Types of non-mandatory public engagements indicative of stakeholder involvement and input • Frequency of non-mandatory public engagement indicative of stakeholder involvement and input	Engagement as communication	Engagement as consultation	Engagement as participation	Mladenovic et al. (2013), ;Osei-Kyei and Chan (2017a); De Schepper et al. (2014)
		Government commitment	Industry forums held and types of public contributions/enhancements.	• Number and type of industry forums signal openness to industry input	No forums held	X	Forums held	Hardcastle et al. (2005); Tiong (1996); Li et al. (2005)
		Experienced/reliable agency	Dedicated unit for alt. delivery or P3	• Presence of dedicated office suggests public agency competency	No dedicated unit or assigned division	Assigned division	Dedicated P3 unit	Jefferies et al. (2002); Esther et al. (2012b)
			Type and years of experience	• Experienced: 3 or more executed prior projects • Developing: 1-2 executed prior projects • Inexperienced: 0 projects	Inexperienced	Developing	Experienced	

		Project is attractive	Revenue potential
			• Tolling: common in region or not
			• Project characteristics:
			  ○ Standalone vs. urban network
			  ○ Extension/expansion vs. greenfield
			  ○ Highly congested vs. limited congestion
			  ○ Few competing routes vs. many alternatives
			• Users: high-income, time sensitive vs. average/lower income
				• Tolling: common that facilities are tolled in region improves revenue potential
				• Project characteristics: revenue potential improved when facility is standalone and extension/expansion in highly congested corridor or region with few competing routes.
				• Users: revenue potential when users are of higher income and time sensitive.
					• Tolling: not common in jurisdiction
					• Project: urban network, greenfield, limited congestion, many alternatives
					• Users: average/low income
						Mixed	• Tolling: common in jurisdiction
							• Project: standalone, extension/expansion, highly congested, few alternatives
							• Users: high income, time sensitive
								Jefferies (2006); (Liu et al. 2017)

		Statutory clearances	ROW acquisition	Progress or completion: • Signals public sector commitment • Reduces risk of termination or delay	Not started	In progress	Completed or pending approval	
			NEPA progress		Not started	In progress	Completed or pending approval	
	Investor & User/Citizen	Stakeholder engagement	Types and number of public meetings	• Number of opportunities for public input ○ More meetings increase the likelihood that either support or opposition will surface	Limited meetings	Some engagements	Regular periodic engagements	Nederhand and Klijn (2019; De Schepper et al. (2014)

Stages/Phases	Stakeholder	Key interests	Performance indicators	Interpretation	Not Met	Partially Met	Fully Met	Sources
				○ More meetings increase likelihood for public input				
			Forms of communication/engagement	• Types/forms of engagement utilized. ○ Multiple means for input increases likelihood that either support or opposition will surface. ○ Multiple means for input increases likelihood of inclusion of public input	Engagement as communication	Engagement as consultation	Engagement as participation	
	Producer	Scope of work offers degrees of freedom	Design flexibility exists/remains (i.e., design not advanced beyond 30%)	• Level of design completed – schematic or illustrative design levels provide opportunity for alternatives/technical enhancements	~30% design	X	<30% design	Chan et al. (2010); Li et al. (2005c); Liu et al. (2015b)
		Baseline site conditions	Potential for unforeseen conditions	• Site conditions in existing corridor more likely known	Existing corridor	X	Greenfield	
Procurement	State	Best value evaluation process	Evaluation process and criteria	• Competitive vs. Non-Competitive • If competitive, procurement follows "best-value" principles/practices	Non-Competitive	• Competitive • Best-value principles not followed	• Competitive • Best-value approach	Liu et al. (2017) Tiong (1996); Jefferies et al. (2002);
		Market interest	Number short-listed teams	• Higher number improves competitive potential	≤2	X	3-4	Garvin (2010)
			Number of proposals received	Higher number improves likelihood of receipt of "best value"	≤2	X	3-4	
		Minimize financial commitments or exposure	• Amount and type of public contributions • Financial structure • Debt/Equity ratio	• Limited public subsidies or guarantees decreases exposure. • Debt: equity ratio – more equity, more private leverage, and stake	• Public subsidies >20% of funding, significant guarantees • No equity invested	Mixed	• Public subsidies<10% • Equity>10%	Osei-Kyei and Chan (2017c); (Jacobson and Ok 2008a)
	Investor	Reliable and fair process	Procurement and contracting guidelines in place	• Defined procurement process improves predictability	No guidelines	X	Published guidelines	Zhang (2005c), Li et al. (2005);Chan et al. (2010)
			State limits number of competitors through shortlisting process	• 3-4 shortlisted teams improve probability of award and return on business development funds	No shortlisting	Shortlisted teams > 4	Shortlisted teams of 3-4	
			Time from notice to commercial close & commercial to financial close	• Duration from notice to commercial close indicative of efficiency and effectiveness of procurement process • Duration from commercial to financial close indicative of quality of agreement	• >4 years • >12 months	• 3-4 years • 6-12 months	• ≤3 years • ≤6 months	
	Producer	Potential to modify scope of work to add value/reduce cost	• ATC/AFC process -OR- • Potential to negotiate adjustments of scope	• Inclusion of process in RFP provides opportunity to add value through technical/financial enhancements. -OR- • Ability to negotiate scope provides opportunity to add value through technical/financial enhancements. • Probity safeguards public and private sectors	No ATC/AFC process in RFP -OR- No or limited opportunity to negotiate scope adjustments after selection	X	ATC/AFC process outlined in RFP -OR- Negotiation of scope up to NEPA limits after selection	Jefferies et al. (2002); Esther et al. (2012b);Shi et al. (2016)
	User	Transparent and legitimate process	Followed relevant procurement laws/regulations	• Complied with regulations	Non-compliant	X	Compliant	Liu et al. (2014b), 2017); Liu et al. (2016c)
			Progress and outcomes communicated	• Communicated progress and outcomes to public	No or limited communication	X	Consistent communication	
			Procurement documents publicly available	• Made procurement documents readily available (i.e., posted to website)	Not available	X	Available	

Stages/Phases	Stakeholder	Key interests	Performance indicators	Interpretation	Not Met	Partially Met	Fully Met	Sources
			Rationale for selecting preferred proposer known	• Agency identifies and communicates basis of selection	Not publicly disclosed	X	Publicly disclosed	
Contract	S, I, P	Equitable allocation of risk	Risk profile	Risks are apportioned in accordance with prevailing practices or precedents	• Risks retained or transferred inconsistent with prevailing practice	X	• Risks retained and transferred consistent with prevailing practice	Yuan et al. (2012); Almarri and Boussabaine (2017a)
	State/User	Protecting public interest	Aspects considered: • Revenue sharing • Limits on financial commitments by state • Concession period length	• Contract provisions allow sharing in upside and limit long-term commitments by state • Longer concession periods increase "lock-in" effect	• No sharing provisions • No limits on state commitments	X	• Sharing provisions • Commitments by state clear and bounded	Tang et al. (2010); Zhang et al. (2016)
Implementation	State	Specified asset delivered	Opens on time and conforms to agreed scope	• Project opens when expected. • Scope of work completed and commissioned	• Project does not open on time • Scope not completed and not functional	Either but not both	• Project opens on time • Scope completed and functional	Almarri and Boussabaine (2017b); Yuan et al. (2012b)
	Investor	On time and on budget	Cost and schedule overruns	Cost increases or delays impact revenue amount or timing and decrease ROI Impacts DBJV profit margin and incurs possible liquidated damages	• Behind schedule • Over budget	Mixed outcomes	• On or ahead of schedule • On or under budget	Yuan et al. (2009a) Liu et al. (2016a)
	Producer	Effective and efficient delivery	Meets SPV milestones	Meets SPV/Investor requirements for facility opening	• Opens late	X	• Opens on time or early	(Li et al. 2005a); (Osei-Kyei and Chan 2015b)
			Number of claims or disputes	Greater number of claims/disputes indicates delivery issues	Major claims	X	No claims	
			No major accidents during construction	Major safety accidents indicate delivery issues	Major accidents occur	Mixed	No major accidents or incidents	
	User	Minimal inconveniences and environmental impacts	Major incidents during construction	Occurrence and number of major incidents (environmental, safety, traffic disruptions) indicative of adverse impacts on community	Major incidents that disrupt/impact community	X	No major incidents that disrupt/impact community	(Osei-Kyei and Chan 2015a)
			Complaints from citizens/businesses	Number of complaints indicative of adverse impacts on community	Limited, infrequent complaints	X	Many, frequent complaints	
Service delivery	State	Service meets or exceeds expectations	Service indicators (dependent on type and purpose of project)	• Increases or decreases in service indicators suggest level of service provided	Negative trend	X	Positive trend	Qiao (2001); Almarri and Boussabaine (2017a);Liu et al. (2014b)
			Penalties or sanctions/bonuses	• Number and frequency of sanctions/bonuses suggest poor/good service and management	• Sanctions imposed	X	• No sanctions • Bonuses awarded	
	Investor	Return on investment	Actual Traffic & Revenue	• Actual > Expected: ROI increase • Actual = Expected: ROI expected • Actual < Expected: ROI decrease	Actual < Expected	X	Actual ≥ Expected	Mladenovic et al. (2013) Almarri1 and Halim (2017)
			Equity invested or divested	• Divested equity suggests meeting ROI • Invested equity suggests covering revenue shortfalls	Additional equity invested to cover shortfalls	No changes in equity amount	Equity divested	
	Producer	Asset performance/Operation effectiveness	Compliance with standards	• Number of sanctions or penalties indicates level of compliance	Sanctions/penalties imposed	X	No sanctions/penalties	Lima and Cruz (2016); Yuan et al. (2012c)
			Changes in oversight by the State	• Increased oversight suggests frequent non-compliance	Oversight increased	X	Oversight unchanged	

Stages/Phases	Stakeholder	Key interests	Performance indicators	Interpretation	Not Met	Partially Met	Fully Met	Sources
	User	Adds expected value	User patronage and satisfaction	• Usage level indicates need/demand • Drivers' surveys illustrate levels of satisfaction	Negative trends	X	Positive trends	Yuan et al. (2009), Mladenovic et al. (2013)
			• Increase of job creation, • Increase of commercial development	• More jobs (short or long-term) as consequence of project benefits community • More commercial development as consequence of project benefits community	Limited job creation and business opportunities	X	Job creation and business opportunities as a result of project	Liu et al. (2015a); Yuan et al. (2009a)

A. Stakeholder Interests in the Enabling Environment

The enabling environment establishes the policies and conditions for planning and implementing P3s. The normative literature has identified a number of CSFs related to a project's setting and environment. Authors have emphasized the importance of enabling legislation and a favorable legal framework to facilitate P3s (Li et al. 2005; Osei-Kyei and Chan 2015) and have stressed that the prevailing legal and political environment is conducive for P3 activity (Jeffares et al. 2013; Zhang 2005). Favorable legislation may also attract private investors (Qiao et al. 2001). Recently, Albalate et al. (2020) identified advantageous legislative provisions for P3s, ranked corresponding legislation by jurisdictions in the US based on a favorability index and found correlation between favorable legislation and private investment. Further, Mladenovic et al. (2013) identified a transparent legal framework as a critical factor for stakeholders in the public sector. These factors and findings suggested that the interests of the state are served if its enabling legislation supports P3s and private investment.

Another common theme in the P3 CSF literature is the need for social and political support and stability (Jefferies et al. 2002; Li et al. 2005; Mladenovic et al. 2013). Political support reduces the potential for disruptions of P3 planning and implementation, and Liu et al. (2014) highlighted the need to comprehensively assess the political and social environments (as well as legal and economic). In addition, the availability of finance and governmental enhancements are also underscored by several studies (Chou and Pramudawardhani 2015; Li et al. 2005). These factors revealed that the interests of investors are maintained if the socio-political environment is supportive and stable, and the investment environment is favorable.

For a project's setting and environment, the interests of producers are closely aligned with those of investors. A supportive and stable socio-political environment decreases the likelihood that issues affecting the provision of services may arise during project implementation. Similarly, the availability of finance and a favorable investment environment gives producers options for any necessary financial arrangements in implementation such as lines of credit. Consequently, producer interests were considered comparable to investors in the enabling environment.

Citizen engagement is also addressed in the P3 CSF and performance literature; citizens should be apprised of P3 policies and activities as well as have the opportunity to

contribute as P3 projects are shaped and implemented (Nederhand and Klijn 2016). The literature also emphasizes engagement actions to understand citizen and user interests, needs and constraints as they relate to P3 project development (Chan et al. 2010; Ng et al. 2012). Therefore, these factors indicated that the basic standard for serving the interests of citizens are defined processes and points for input that act as checks and balances during P3 development.

B. Indicators and Interpretation of Stakeholder Interests in the Enabling Environment

With key stakeholder interests identified, the next steps were to identify indicators of these interests and a means to interpret them to gauge the extent that these interests were served. For the state interest of "enabling legislation supports P3 project delivery", the indicators selected include: (1) types and number of projects authorized, (2) both solicited and unsolicited proposals permitted, and (3) funding sources authorized. Rall et al. (2010) completed an assessment of P3 legislation in the United States for the National Council of State Legislators (NCSL), so it served as a principal source for these indicators. Interpretation conditions for these indicators resulted in a binary characterization of the legislation: broad or limited. Broad legislation has no restrictions on the number or types of projects, allows both solicited and unsolicited proposals and has no or limited restrictions on the use of public and private funds in project development. Limited legislation is either project-specific, meaning the legislation only authorizes a project or a set of pilot projects, or it imposes restrictions on the types of projects, unsolicited proposals and use of public and private funds. With broad legislation, states are positioned to adopt a programmatic approach to develop and implement P3s over time (Gifford and Transue 2015). Hence, interests of the state are "fully met" with broad legislation and "not met" with limited legislation.

For the investor/producer interest of "socio-political stability that limits risks", the following indicators were chosen: (1) legislative or executive oversight process defined, (2) legislation or executive guidelines define any stakeholder engagement requirements, and (3) limited opportunity for "last minute" modification or termination of a project by legislative action. The first indicator considers whether a jurisdiction's evaluation and approval process is published and readily available. Typically, these would be in the form of guidelines that generally spell out how a project advances from identification to award; having such guidelines enhances transparency, particularly for private participants (O'Shea et al. 2020). Interpretation for this indicator ranged from no guidelines published or the process is not

established as “not met” to the process is established but not fully documented as “partially met” to guidelines published as “fully met”. The second indicator examines whether the legislation or executive guidelines define any stakeholder engagement requirements beyond what is required for environmental permitting and approval (i.e., the NEPA process in the US); such mandates suggest the role of public input in the overall decision-making process. Here, interpretation is binary with non-NEPA engagements defined or not as being “met” and “non-met” respectively. The final indicator examines whether the evaluation and approval process for P3s entails legislative approval of projects prior to award. Such requirements can increase political risk and discourage private participation (Ortiz and Buxbaum 2009; Rall et al. 2010). Interpretation conditions for this indicator include legislative approval required as “not met”, legislative involvement (i.e., appointment of a review panel) but not strict approval required as “partially met” and legislative approval not required as “fully met”.

For the investor/producer interest of “favorable investment environment”, four indicators were identified: (1) the public sector’s record of transactions and private investment in transportation projects, (2) creditworthiness of owner, and (3) types of governmental instruments or programs available to support private investment. The first indicator examines the contemporary record of P3 transactions and private investment in the jurisdiction under the enabling legislation; these factors illustrate overall experience of relevant institutions in the jurisdiction (particularly financial institutions) with such arrangements. No prior projects are interpreted as “not met”, 1-2 prior projects with private equity or innovative financial instruments employed is interpreted as “partially met”, and 3 or more projects with private equity and/or innovative financial instruments used as “fully met”. The second indicator considers the creditworthiness of the owner based on its issuer rating by rating agencies such as Fitch, Moody’s, or Standard & Poor. Here, a higher rating is indicative of the state’s or public agency’s capacity to meet any financial obligations pledged to P3 projects; a C-level rating is interpreted as “not met”, a B-level rating is interpreted as “partially met”, and an A-level rating is interpreted as “fully met”. Finally, the third indicator examines whether governmental instruments or programs that support private investment in infrastructure are available. In the US, key instruments for this purpose are the Transportation Infrastructure Finance and Innovation Act (TIFIA) program and Private Activity Bonds (PABs); both of these are federal initiatives to incentivize private investment in infrastructure (Wagener 2014). Hence, interests are “not met” if these programs are not available, “partially met” if either TIFIA assistance or PABs is available, and “fully met” if both are available.

For the user and citizen interest of "checks and balances in the development process", two indicators were selected: (1) process for accepting/approving P3 projects is defined and historically followed, and (2) mandated opportunities for citizen/community input and engagement. The first indicator is similar to the investor/producer indicator of legislative or executive oversight process defined, but the perspective is different; defined processes are important to the investor/producer to enhance predictability of outcomes whereas for the users and citizens a defined process and compliance with it affords better governance and accountability (O'Shea et al. 2020). Interpretation conditions for this indicator range from no process published or established as "not met" to process established but not fully documented as "partially met" to process published as "fully met". The second indicator is also similar to the investor/producer indicator of defining stakeholder engagement requirements; here, better alignment exists between their interests. For investor/producers, this signals the policy stance taken toward public engagement while for users and citizen this suggests whether their input is sought; doing so can increase a project's legitimacy (Boyer et al. 2016). User and citizen interests are "not met" if engagements are not mandated, "partially met" if engagements are limited, and "fully met" if engagements are mandated throughout the evaluation and approval process.

3.3.3 Performance Dimensions and Levels of Performance Assessment

As indicated previously, Table 3-1 illustrates the P3 stakeholder interests register that summarizes the interests, indicators, and interpretation for each of the four stakeholders in a project's setting and each project phase. The sets of interests (with their respective indicators) were further grouped to form eleven performance dimensions; these performance dimensions organize the stakeholder interests into common areas. Finally, these dimensions were linked to the levels of performance: planning, project management, and business. Table 3-2 illustrates these connections. The future potential level of performance assesses trends in the performance dimensions of service quality, revenue and operations, and project impact in the service delivery phase. This assessment considers the overall prospects for the project itself as well as its broader impacts such as economic development in the region and even the P3 market such as potential precedents set.

Each performance dimension was evaluated based on the assessments of the corresponding stakeholder interests. For instance, the "project environment" performance dimension encompasses the stakeholder interests of: (a) enabling legislation supports P3 project delivery, (b) socio-political stability that limits risks, (c) a favorable investment

environment, and (d) checks and balances in the development process. Consequently, a dimension's performance depends on the extent to which stakeholder interests were met; the evaluation of a dimension: (1) examined how many interests associated with a dimension were fully met, partially met, or not met, and (2) considered the underlying reasons associated with the assessment of interests. Once completed, a conditional conclusion was drawn about each performance dimension. Similarly, the levels of performance were based on the performance dimension assessments, so "planning performance" was contingent on: (1) Project Environment, (2) Identification of Need, (3) P3 Determination & Suitability, (4) Stakeholder Management, and (5) Public Agency Capacity. Hence, another qualified conclusion about each level of performance was made based on its corresponding performance dimension evaluations. The conclusions were considered "conditional/qualified" since the intent of the normative framework is to establish a baseline of performance for a project. The framework alone provides substantive but not definitive evidence of the four levels of performance.

Table 3-2 Performance assessment framework

Setting/Phase	Stakeholders	Key Interests	Performance Dimensions	Levels of Performance
Enabling Environment	State	Enabling legislation supports P3 project delivery	(1) Project Environment	Planning Performance
	Investor & Producer	Socio-political stability that limits risks		
		Favorable investment environment		
	User/Citizen	Checks & balances in development process		
Shaping	State	Clear need for project	(2) Identification of Need	
		Due diligence to determine P3 suitability	(3) P3 Determination & Suitability	
		Stakeholder management	(4) Stakeholder Management	
	Investor	Government commitment	(5) Public Agency Capacity	
		Experienced/reliable agency		
		Project is attractive	(3) P3 Determination & Suitability	
		Statutory clearances		
	Investor & User/Citizen	Stakeholder engagement	(4) Stakeholder Management	
	Producer	Scope of work offers degrees of freedom	(3) P3 Determination & Suitability	
		Baseline site conditions		
Procurement	State	Best value evaluation process	(6) Procurement Process	Project Management Performance
		Market interest		
		Minimize financial commitments or exposure		
	Investor	Reliable and fair process		
	Producer	Potential to modify scope of work to add value/reduce cost		
	User/Citizen	Transparent and legitimate process		
Contract	State, Investor, Producer	Equitable allocation of risk	(7) Risk Management	
	User/Citizen	Protecting public interest		
Implementation	State	Asset delivered on time and fit for purpose	(8) Project Delivery	
	Investor	On time and on budget		
	Producer	Effective and efficient delivery		
	User/Citizen	Minimal inconveniences and environmental impacts		
Service Delivery	State	Service meets or exceeds expectations	(9) Service Quality	Business Performance
	Investor	Anticipated return on investment	(10) Revenue & Operations	
	Producer	Asset performance/Operation effectiveness		
	User/Citizen	Adds expected value	(11) Project Impact	

3.4 Application of the Framework to I-495 Capital Beltway P3 in Virginia

The I-495 beltway encircling the nation's capital serves as the vital connection that integrates major regional highway networks while serving the day-to-day traffic of the Washington, DC, and metropolitan region is notorious for its traffic congestion. The I-495 Capital Beltway Express, one of the first surface transportation P3 projects in Virginia, is a Public-Private Transportation Act (PPTA) project between VDOT and Capital Beltway Express, LLC (a joint venture of Fluor and Transurban). The project developed 13-miles of managed lanes. Figure 3.3 depicts the limits of the project as well as its organizational and financial structure.

Data were collected from multiple sources to support application of the framework including governmental documents or records, project documents, third-party reports or articles, and academic reports or articles. This data was organized into a table to support assessing the indicators of stakeholder interests in the P3 stakeholders interests register. Two researchers completed the assessments of the indicators in the register and compared their results to determine a level of agreement. In instances of disagreement, the researchers discussed the reasons behind their assessments until an agreement was reached. Typically, the source of disagreement was one researcher had overlooked data or interpreted it differently. During this process, elements of the register were refined to improve its objectivity. Table 3-3 depicts the completed register for the I-495 Capital Beltway Express P3, which assesses the extent to which the interests of each stakeholder were met

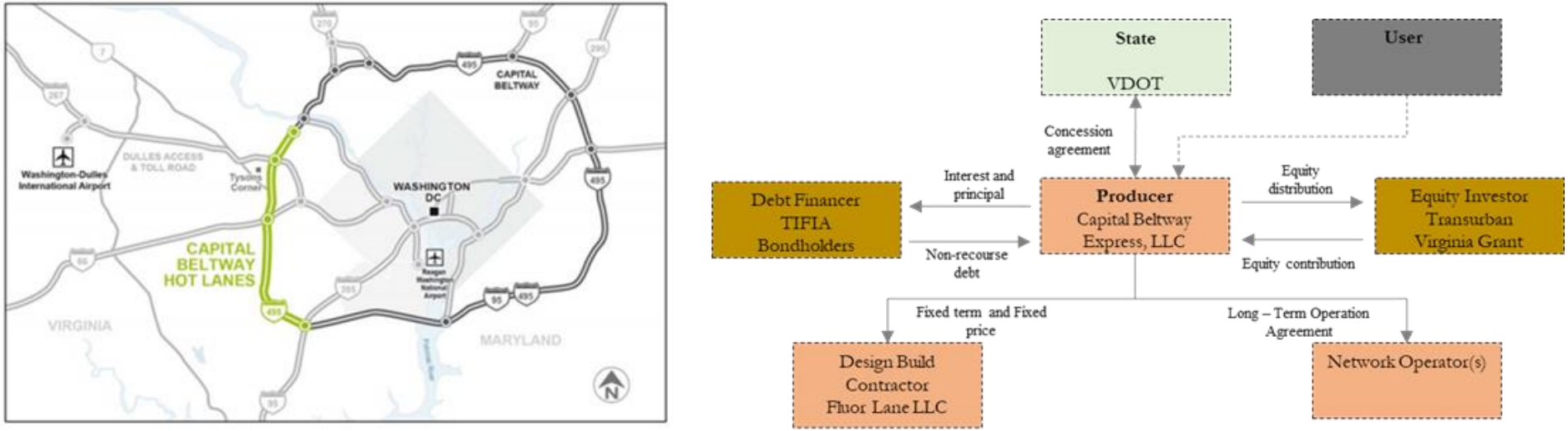


Figure 3.3 Capital Beltway Express project location and organizational/financial structure

Table 3-3 P3 Stakeholders Interests Register for I-495 Capital Beltway Express

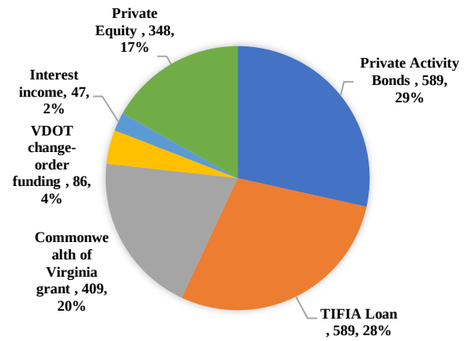
Stages/Phases	Stakeholder	Key interest and Expectations	Performance Indicators	Observations	Interpretation of Interests Met	Indicator	Performance Dimensions	Sources for Observations
Enabling Environment	State	Enabling legislation supports P3 project delivery	• Types and number of projects authorized. • Solicited and unsolicited proposals permitted. • Funding sources authorized	PPTA legislation was passed in 1995. • Roads and highways are eligible for P3s • Authorizes VDOT to receive solicited and unsolicited proposals In case of unsolicited proposals, allows to provide notice and extend an opportunity to accept competing proposals. • Allows the combination of public and private funds for project development	• Broad – Fully Met • Enabling legislations has no restrictions on developing transportation projects as P3s. The main legislation was passed in 1995, and it has been amended subsequently to modify and clarify provisions.	↑	**Project Environment**	• (PPTA 2001) [as amended through 2001] • (Garvin 2019) • (PPP Contract Managment 2007)
	Investor & Producer	Socio-political stability that limits risks	Legislative or executive oversight process defined	• PPTA proposals evaluated following a multi-phase (4 phase) process as outlined in its implementation guidelines: ○ Phase One: Initial Review Committee ○ Phase Two: The Commonwealth Transportation Board Approval ○ Phase Three: Public-Private Transportation Advisory Panel Recommendation ○ Phase Four: The Commonwealth Transportation Commissioner's Selection • Legislative oversight is defined, and oversight process are inclusive for all type of stakeholders	• Guidelines published – Fully Met • Multi-step evaluation process is detailed in VDOT Implementation Guidelines, published following enactment of PPTA; Guidelines are updated periodically. • This phased approach demonstrates strong coordination and project appraisal process.	↑		• (PPTA 2001; The Commonwealth of Virginia 2005) • (Gifford and Transue 2015) • (Trip Pollard 2012)
			Legislation or executive guidelines define any stakeholder engagement requirements	• Implementation guidelines required copies of conceptual and detailed proposals to be provided to affected local jurisdictions for written comment within 60 days of receipt of proposal.	• Non-NEPA engagements defined – Fully Met • Implementation guidelines require written comments from affected local jurisdictions that proposers will be expected to address	↑		• (PPTA 2001; The Commonwealth of Virginia 2005) 1. (Brown et al. 2007) • (Denise V. Cheney 2018)
			Limited opportunity for "last minute" modification or termination of a project by legislative action	• Multi-phase evaluation process does not include any legislative approvals; once CTB and Advisory Panel recommendations are made/approved, then VDOT can proceed to negotiate a comprehensive agreement.	• No legislative approval required – Fully Met • Evaluation and approval is delegated to executive agencies; no legislative approvals required	↑		• Reference to 2001 and 2005 Impl Guidelines • (Gifford and Transue 2015)
		Favorable investment environment	Record of transactions and private investment in transportation projects • Number of prior P3 projects • Private equity and debt in prior projects	• 1 project • Route 895 (Pocahontas Parkway) developed under PPTA • Structured as 63-20 Corporation and issued tax-exempt toll revenue bonds - $354 million • SIB loan - $18 million • Federal funds for design costs - $9 million	• One prior project under PPTA – Partially Met • Route 895 did not have private equity investment typical of P3 arrangements but did establish 63-20 entity to issue bonds secured by project itself.	↔		• (William G 2007) • (Virginia Department of Transportation (VDOT) 2005) • (FWHA 2006)
			Creditworthiness of owner	• In order to ensure access to low-interest debt, Virginia had established the Debt Capacity Advisory Committee (DCAC) in 1991 to maintain the Commonwealth´s AAA credit rating. • DCAC's model employs a non-binding debt-service ceiling equaling 5% of state revenues.	• AAA credit rating – Fully Met • VDOT maintained high credit rating to meet financial obligations having a ceiling of 5% of state revenues; this favors agency's ability to meet any financial obligations to P3 projects	↑		• (Commonwealth of Virginia 2017) • (Debt Capacity Advisory Committee 2012)
			Types of governmental instruments or programs	• TIFIA program available; TIFIA legislation enacted in 1998 SAFETEA-LU (Section 11143) passed in 2005 included provisions allowing tax-exempt Private Activity	• TIFIA and PABs available – Fully Met • Investor has the opportunity to utilize governmental instruments such as	↑		• (FWHA 2006) • ("Build America Bureau" 2021)

Stages/Phases	Stakeholder	Key interest and Expectations	Performance Indicators	Observations	Interpretation of Interests Met	Indicator	Performance Dimensions	Sources for Observations
			available to support private investment	Bonds (PABs) for up to $15 billion in selected highway and freight projects developed and operated by private parties .	TIFIA and PABs to support private investment.			
	User/ Citizen	Checks & balances in development process	Process for accepting/approving projects as P3 is defined and historically followed	• Multi-phase evaluation process published in Implementation Guidelines. • limited track record at this juncture	• Process published – Fully Met • Process for accepting/approving projects as P3s is defined and followed	↑		• Reference to VDOT Impl. Guidelines of 2001 • (Brown et al. 2007) • (Denise V. Cheney 2018)
			Mandated opportunities for citizen/community input and engagement	• Affected local jurisdictions had 60 days to provide written comments; process outlined requires proposers to address written comments received.	A single mandated opportunity for written comments – Partially Met	↔		• Reference to VDOT Implementation Guidelines of 2001
Project shaping	State	Clear need for project	Project in long term transportation plan	• Major Investment Study (MIS) in 1997 by VDOT, • Proposed improvements may include high occupancy vehicle (HOV) travel and bus transit.	Yes: project in the long-term plan to improve the congestion in the corridor.- Fully met	↑	**Identification of Need**	• (Brown et al. 2007)
			Project in published pipeline	No; VDOT had not adopted this practice at this time	I-495 project was not in a published pipeline by VDOT.- Not Met	↓		
			Transportation conditions • LOS/congestion • Safety • Etc.	• Congestion – Average 5- 6 hrs. • Costs Virginians $1.7 billion annually in delays and wasted fuel. • More than 80 percent of area commuters drive to work alone. • Travel will increase 50% by 2025	Conditions warranted consideration of improvements to address congestion and trip times- Fully Met	↑		• (Virginia Dept of Transportaion 2015) • Transurban websites
		Due diligence to determine P3 suitability	P3 value drivers considered: • Risk transfer • Accelerated delivery • Private efficiencies	• Estimated cost of 4-4-4-4 configuration planned by VDOT was $2.5 billion. • VDOT would likely need to wait another 20+ years to develop I-495 improvements if self-financed	Qualitative factors not explicitly considered before submission of unsolicited proposal.- Not Met	↓	**P3 Determination & Suitability**	• (Bolaños et al. 2017; Daito et al. 2013)
			Planning/feasibility studies	• EIS started in 1995, MIS in 1997 with DEIS published in 2002 • CBA study was included in NEPA documents.	VDOT had planned and performed feasibility studies, which had arrived at the 4-4-4-4 configuration and a $2.5 billion price tag. This opened the door for the Fluor proposal. – Fully Met	↑		• (Department of Transportaion Commonwealth of Virginia 2006)
			T&R studies	• Estimated avg. peak-hour volume on HOV/HOT 3,200/hours and base line. • Fluor and Transurban had “investment grade” T&R study completed by Stantec and Vollmer in February 2007	Fluor and/or Transurban completed T&R studies throughout shaping phase – Fully Met	↑		• Fluor proposal (2002)
			Business Case and/or VfM analysis	• No VfM studies.	No specific ex ante study i.e., VFM was not observed.- Not Met	↓		• (Department of Transportaion Commonwealth of Virginia 2006).
		Stakeholder Management	Stakeholder engagement strategy • Non-mandatory engagement • Citizen advisory committees, etc.	Public hearings held in May 2002 as part of NEPA approval process leading to DSIS.	Stakeholder engagement observed- Fully Met	↑	**Stakeholder Management**	• (Bolaños et al. 2017)
	Investor	Government commitment	Industry forums held and types of public contributions/enhancements.	• No industry forums held • VDOT had published Implementation Guidelines as required by PPTA	• No industry forums held- Partially Met	↔	**Public Agency Capacity**	

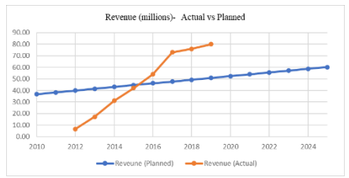
Stages/Phases	Stakeholder	Key interest and Expectations	Performance Indicators	Observations	Interpretation of Interests Met	Indicator	Performance Dimensions	Sources for Observations
		Experienced/reliable agency	Dedicated unit for alt. delivery or P3	• No dedicated office but VDOT had "Alternative Project Delivery Division" within state •	VDOT experience was "developing"; with P3s, were pioneering such efforts at the time- Partially Met	↔		
			Type and years of experience	• PPTA projects at time limited to development of Route 895 (Pocahontas Parkway) and then its lease to Transurban in 2006		↔		• (FWHA 2006)

		Project is attractive	Revenue potential
			• Tolling: common in region or not
			• Project characteristics:
			  ▪ Standalone vs. urban network
			  ▪ Extension/expansion vs. greenfield
			  ▪ Highly congested vs. limited congestion
			  ▪ Few competing routes vs. many alternatives
			• Users: high-income, time sensitive vs. average/lower income
				• Tolls are not common in the area
				• Urban setting
				• Extension/expansion
				• Highly congested
				• Few alternatives in region
				• Corridor part of large network
				• User : High income , time sensitive
					Capital Beltway integrates with major highways (I 270 and I 95) and serve as nexus to the day-to-day traffic of the Washington, DC, metropolitan region. - Fully Met	↑	**P3 Determination & Suitability**	• (PPP Contract Management Report 2012)

		Statutory clearances	ROW acquisition	• Draft environmental Impact statement published March 2002, • Final Environmental Impact Statement published March 2007; VDOT completed NEPA process at this time • Fluor and Transurban obtained all required permits prior to construction	The processes were fully compliant with FWHA and NEPA regulations. Complaint – Fully Met	↑		• (Department of Transportaion Commonwealth of Virginia 2006) • (FWHA 2006)
			NEPA progress					
	Investor & User/Citizen	Stakeholder engagement	Types and number of public meetings	• Public hearing held as part of NEPA approval. • Community engagement, public meetings, • Indicative of willingness of VDOT and concessionaire to accept input	Early and comprehensive public engagement with key stakeholders was done during the preconstruction stages. – Fully Met	↑	**Stakeholder Management**	• (Global Infrastructure Hub 2014) • http://www.p3virginia.org/projects/i-495-express-lanes/ • (AECOM 2007a)
			Forms of communication/engagement		Various modes of public engagement were utilized – Fully Met	↑		
	Producer	Scope of work offers degrees of freedom	Design flexibility exists/remains (i.e. design not advanced beyond 30%)	• VDOT worked with Flour collaboratively to develop a technical solution. • Four general-purpose lanes and two HOT lanes in each direction, i.e., a 4-2-2-4 configuration instead of original 4-4-4-4	The changes/configuration required only seven houses to be demolished compared to the original 350.	↑	**P3 Determination & Suitability**	• (PPP Contract Management Report 2012) • (Bolaños et al. 2017)
		Baseline site conditions	Potential for unforeseen conditions	• The fluor proposal is different from that of VDOT's prior plan. HOT lane will be built on the median.	Presumably, developer had investigated the geotech report by themselves- Fully Met	↑		• (Daito et al. 2013)
Procurement	State	Best value evaluation process	Evaluation process and criteria	• Non-competitive: unsolicited proposal • When no competing conceptual proposals received within 45 days, VDOT asked Fluor to present a detailed proposal. PPTA process followed	Non – competitive- Not Met	↓	**Procurement Process**	(Garvin 2019)

Stages/Phases	Stakeholder	Key interest and Expectations	Performance Indicators	Observations	Interpretation of Interests Met	Indicator	Performance Dimensions	Sources for Observations
		Market interest	Number short-listed teams	• 0, unsolicited proposal by Fluor	Only one by Fluor – Not met	↓		
			Number of proposals received	01	Only one by Fluor – Not met	↓		
		Minimize financial commitments or exposure	• Amount and type of public contributions • Financial structure • Debt/Equity ratio	 • Payment to concessionaire if HOV threshold is exceeded. • VDOT contributes $409 million subsidy. • VDOT is not responsible for any debt repayment for the life of the project. • Structure helps VDOT stay within state debt limits.	• Balanced for State- Partially Met • Commonwealth of Virginia grant - $409 M • VDOT change-order funding - $86 M • In I 495 the higher public subsidies (20%+) increase the exposure of the state/agency. • The project should not greatly impact state debt limits.	↔		• (FWHA 2006)
	Investor	Reliable and fair process	Procurement and contracting guidelines in place	• As per PPTA process, criteria were followed. • Fluor was aware of the Implementation Guidelines of PPTA at that time.	Guideline published – Fully Met	↑		• PPTA (2001)
			State limits number of competitors through shortlisting process	• One unsolicited proposal.	Supported the investor for the securing the project.- Fully Met	↑		• (Global Infrastructure Hub 2014)
			Time from notice to commercial close & commercial to financial close	• Flour submission August 2002 • Financial close Dec 2007 • Construction began in spring 2008	5 years and 4 months from submission of unsolicited proposal to financial close – Long period- Not Met	↓		• (AECOM 2007a)
	Producer	Potential to modify scope of work to add value/reduce cost	ATC/AFC process -OR- • Potential to negotiate adjustments of scope	• VDOT, Fluor and Transurban (CBE) worked for 5 years to develop design and negotiated scope of work. • The Express Lanes planned to commuter bus services, high occupancy vehicles (HOV-3), and other vehicles with electronic transponders	• Strong collaboration- Fully Met. • Different design provision was provided by Fluor to reduce the footprint and lane configuration. • Design and negotiation period is long and expensive. • Higher transaction cost.	↑		• (Minnesota Department of Transportation 2009) • Innovative Finance in Action Virginia I-495 HOT Lanes (October 2009) • (Office of Public-Private Partnerships 2019)
	User	Transparent and legitimate process	Followed relevant procurement laws/regulations	• VDOT followed PPTA Act and Implementation Guidelines.	As per PPTA – Fully Met	↑		(PPTA 2001; The Commonwealth of Virginia 2005)
			Progress and outcomes communicated	• Yes, as per legislative provision VDOT updated to public about development	As per PPTA – Fully Met	↑		

<table>
<tr><th>Stages/Phases</th><th>Stakeholder</th><th>Key interest and Expectations</th><th>Performance Indicators</th><th>Observations</th><th>Interpretation of Interests Met</th><th>Indicator</th><th>Performance Dimensions</th><th>Sources for Observations</th></tr>
<tr><td rowspan="2"></td><td rowspan="2"></td><td rowspan="2"></td><td>Procurement documents publicly available</td><td>• Yes, ARCA and exhibits posted (A- U)</td><td>Published- Full Met</td><td>↑</td><td rowspan="2"></td><td>(Office of Public-Private Partnerships 2019)</td></tr>
<tr><td>Rationale for selecting preferred known</td><td>• Advisory Panel outlined support and concerns in recommendation to proceed with negotiations in letter to VDOT Commissioner on 6/28/2004</td><td></td><td>↓</td><td></td></tr>
<tr><td rowspan="2">Contract</td><td>S, I, P</td><td>Equitable allocation of risk</td><td>Risk profile</td><td><table><tr><th>Risk(s)</th><th>Public</th><th>Private</th><th>Shared</th></tr><tr><td>Design</td><td></td><td>√</td><td></td></tr><tr><td>Permit</td><td></td><td></td><td>√</td></tr><tr><td>Financing</td><td></td><td>√</td><td></td></tr><tr><td>Right of way</td><td></td><td>√</td><td></td></tr><tr><td>Environmental permit</td><td></td><td></td><td>√</td></tr><tr><td>Operating expenses and Maintenance</td><td></td><td>√</td><td></td></tr><tr><td>performance</td><td></td><td>√</td><td></td></tr></table></td><td>Indicates as P3 practices</td><td>↔</td><td rowspan="4">Risk Management</td><td>(Nguyen et al. 2018a)</td></tr>
<tr><td>State/User</td><td>Protecting public interest</td><td>Aspects considered:
• Revenue sharing
• Limits on financial commitments by state
• Concession period</td><td>• Toll revenue will be shared on the various base case scenarios with VDOT
• The concession contract agreement emphasized supportive clauses on performance, safety and service standards.</td><td>• Aspects considered – Partially Met
• Revenue risk to SPV
• Revenue sharing with VDOT
• Very long concession period.- 80 years</td><td>↔</td><td>(Build America Bureau 2014)</td></tr>
<tr><td rowspan="4">Implementation</td><td>State</td><td>Specified asset delivered</td><td>Opens on time and conforms to agreed scope</td><td>• Project opened on time and with budget.
• State of the Art toll collection system
• First HOT lane project in the USA
• The project will also involve the replacement of more than 50 bridges and overpasses.
• Flour -Lane was DB contractors.</td><td>• Eased Beltway congestion and reduce “cut-through” traffic on local roadways and surrounding regions/ streets.- Fully Met</td><td>↑</td><td>• (Daito et al. 2013)
• (William G 2007)</td></tr>
<tr><td>Investor</td><td>On time and on budget</td><td>Cost and schedule overruns</td><td>No cost and schedule overruns</td><td>Within time and budget – Fully Met</td><td>↑</td><td>Project Delivery</td><td>• (Lane Construction 2014)</td></tr>
<tr><td rowspan="3">Producer</td><td rowspan="3">Effective and efficient delivery</td><td>Meets SPV milestones</td><td>Opened 2 months ahead of deadline. Delivered within budget.</td><td>SPV milestone achieved – Fully Met</td><td>↑</td><td>• (Perez et al. 2016; Population Council 2017; Public Works finance 2015)</td></tr>
<tr><td>Number of claims or disputes</td><td>A change order was issued by VDOT ($125 M) with no extension of time</td><td>Managed within the schedule- Fully Met</td><td>↑</td><td>• (PPP Contract Management Report 2012)</td></tr>
<tr><td>No major accidents during construction</td><td>Safety performance maintained in the I-495 express lanes.</td><td>Nor reported- Fully Met</td><td>↑</td><td>(Lane Construction 2014)</td></tr>
</table>

Stages/Phases	Stakeholder	Key interest and Expectations	Performance Indicators	Observations	Interpretation of Interests Met	Indicator	Performance Dimensions	Sources for Observations
				• Achieved 5 million safe work hours without any major incident through the construction period 2012.				
	User	Minimal inconveniences and environmental impacts	Major incidents during construction	Delivered more than 30,000 construction notices.	Minimize inconvenience – Fully Met	↑		• ("I-95/495 (Capital Beltway) - HOT Lane construction" 2010)
			Complaints from citizens/businesses	No major complaint from citizen or business	Fully Met	↑		
Service delivery	State	Service meets or exceeds expectations	Service indicators (dependent on type and purpose of project)	• Increase of speed limit from 55 mph to 65 mph (June 24, 2013) • A 17-minute average time saving during peak periods, compared to the GP lanes. • An increase of 8-15% in the use of HOV (toll-exempt trips). • Post congestion index is not available	Speed and mobility enhanced - Fully Met	↑	**Service Quality**	• (Transurban 2017)
			Penalties or sanctions/bonuses	A 33-minute average incident clearing time.	No penalty ort sanction imposed - Fully Met	↑		• (Transurban 2017)
	Investor	Return on investment	Actual Traffic & Revenue	During ramp up period (2012-2015) • Due to low traffic flow, the private developer has lost over $300 million since the road's opening in November 2012 • Average volume of traffic for three months ending June 2013 was 35,000 vehicles – 40% of original projections. • During the first six weeks of operation Transurban estimated that the new Express Lanes lost US$11.3 million due to less-than-expected traffic volume. Post ramp up – 2016 • Meeting or exceeding expected traffic revenue from 2016 onward	Positive trend in revenue – Fully Met 	↑	**Revenue & Operations**	• (Transurban 2017, 2018; Virginia Dept of Transportaion 2015) • (Daito et al. 2013) (Virginia Dept of Transportaion 2015)
			Equity invested or divested	• In order for Transurban to stabilize its debt and finances, the project needed an additional $280 million of equity and a $150 million reserve.	Presumably, revenue in the ramp up period trigger the condition- Not Met	↓		• (Jenn Wiggins ;Will Willitts 2014)
	Producer	Asset performance/Operation effectiveness	Compliance with standards	No sanctions observed.	Complaint and No section – Fully Met	↑		• (FWHA 2006)
			Change in oversight by the State	• No increased oversight	No increased oversight observed- Fully met	↑		•
	User	Adds expected value	User patronage and satisfaction	• 75% customer satisfaction in drivers´ satisfaction surveys. • Usage increasing and average toll rate going up (greater willingness to pay) • Satisfaction is also evident for users -only 3% of all Express Lanes trips go unpaid.	Meeting user interest in using and satisfaction – Fully Met	↑	**Service Quality**	• Self-reported by Transurban (2017) • (Bolaños et al. 2017)
			• Increase of job creation, • Increase of commercial development.	• 31,000 jobs were supported due to the project, while about US$3.5 billion in the economy was injected. • USD $490 million has been contracted to disadvantaged enterprise and small, women's and minority enterprises	VDOT and Transurban have reported the similar information.- Fully Met	↑	**Project Impact**	• (Build America Bureau 2014) • (Virginia Dept of Transportaion 2015) • (Chen et al. 2017)

3.4.1 Performance Dimensions and Levels of Performance Assessment

Table 3-3 shows the key stakeholder interests associated with each of the 11 performance dimensions and the corresponding level of performance; each performance dimension was evaluated based on the assessment of its corresponding interests for the I-495 P3. Table 3-3 depicts the P3 stakeholder interests register for the I-495 project; the following sections summarize the performance dimension evaluations based on Tables 2 and 3. The sections are organized by each level of performance.

A. Project Planning Performance

A.1 Project Environment

The project environment dimension includes four stakeholder interests and nine indicators; all of these are associated with the enabling environment. Seven of the nine indicators were assessed as fully met while the remaining two were considered partially met; consequently, stakeholder interests overall were well served on the project environment dimension. Virginia's Public-Private Transportation Act (PPTA) of 1995 and its amendments through 2005 provided the state broad authority to implement P3 initiatives, including authorization to combine public and private funds for projects and to receive both solicited and unsolicited proposals – the latter required a period for notice and acceptance of competing proposals (PPTA 2001), so the state interests were fully met.

From investor and producer perspectives, socio-political stability that limits risks is a key interest with three indicators. Each indicator was assessed as fully met, so these interests were served. Virginia's process for evaluating PPTA proposals was a multi-step evaluation process defined in its published Implementation Guidelines (PPTA 2001). In addition, stakeholder engagement requirements beyond those necessary for environmental approvals were clear since the published guidelines stipulated those copies of conceptual and detailed proposals be provided to affected local jurisdictions for their written comment within 60 days of their receipt. Finally, no legislative approvals were required in the multi-phase evaluation process. Once the Commonwealth Transportation Board (CTB) and Public-Private Transportation Advisory Panel recommendations are made, then VDOT proceeds to negotiate a comprehensive agreement (PPTA 2001).

In terms of the favorability of the investment environment, the state's record of transactions and private investment was limited; VDOT had only completed one project, the Route 895 (Pocahontas Parkway) under the PPTA, so this indicator was only partially met. However, the state's creditworthiness was very strong with a "AAA" rating; in fact, the Debt Capacity Advisory Committee (DCAC) was established in 1991 to preserve this rating. In addition, programs to support private investment such as the TIFIA program and Private Activity Bonds (PABs) were available, so these indicators were fully met. Consequently, the interests of investors and producers were served, but VDOT's lack of overall experience was a shortcoming.

From the user/citizen standpoint, checks and balances in the development process are a key interest with associated indicators of a defined process of accepting or rejecting projects as P3s and mandated opportunities for citizen/community input and engagement. As discussed above, VDOT's four-phase project evaluation process was well-defined, and affected local jurisdictions had 60 days to provide written comments after receipt of a conceptual or detailed proposal, which proposers would be required to address. While the former condition was fully met, the latter was partially met; a jurisdiction only had a single opportunity within the PPTA process to provide input. So, user/citizen expectations were met, but the limited input was a weakness.

A.2 Identification of Need

This performance dimension reflects the crucial interest of the state to establish a clear need for the project, so that it delivers critical public infrastructure services and is regionally significant. Three indicators are associated with this dimension; two of three were fully met while one was not met. The first indicator considers whether the project was in the state's long or short-term transportation plan, which was fully met. VDOT had initiated a Major Investment Study of the I-495 corridor in 1997(Reese 2007), and it was examining the feasibility of various approaches for reducing congestion to include addition of high occupancy vehicle (HOV) travel and bus transit lanes between Springfield and the American Legion Bridge (Fluor Daniel 2003). The second indicator reflects whether the project was included in a published project "pipeline"; some agencies follow this practice to signal projects under consideration or in development (Infrastructure Ontario 2020). VDOT was not using this practice at this time, but this was not uncommon in this era; nonetheless, this indicator was not met. The final indicator considers the

transportation conditions related to the project. Virginia's I-495 corridor had been experiencing average daily congestion of 5-6 hours that cost Virginians an equivalent of $1.7 billion annually in delays and wasted fuel (Virginia Dept of Transportation 2015). Further, traffic volumes were also expected to increase by 50% by 2025 (Brown et al. 2007). Hence, transportation conditions were declining, so this indicator was fully met.

A.3 P3 Determination & Suitability

The P3 determination and suitability performance dimension considers several interests among the state, investors, and producers. P3 determination and suitability refers to factors considered, and steps and processes followed by these stakeholders to conclude that P3 delivery is appropriate for a project. This dimension includes five stakeholder interests and nine corresponding indicators; seven indicators were fully met while two were not met. The state's interests relate to its due diligence to select P3 delivery with indicators of: (1) P3 value drivers considered, (2) planning/feasibility studies conducted, (3) traffic and revenue (T&R) studies completed, and (4) business case and value for money (V*f*M) studies performed. Each of these has an individual outcome that cumulatively support the state's assessment of P3 suitability. For the I-495 project, VDOT had not explicitly considered qualitative value drivers such as risk transfer, accelerated delivery and private efficiencies before receiving the unsolicited proposal by Fluor Daniel, so the first indicator was not met. VDOT had completed its MIS in 1997 and started environmental impact studies in 1995; by 2002, VDOT had arrived at a 4-4-4-4 configuration for the corridor, an estimated cost of $2.5 billion and extensive land acquisition for right-of-way (ROW) needs. In addition, a cost-benefit analysis (CBA) was conducted as part of the on-going NEPA approvals. Hence, VDOT had completed multiple planning studies, so the second indicator was fully met. While the state did not conduct T&R studies, Fluor Daniel commissioned a third-party to complete an initial study as part of its detailed proposal in 2003. Subsequently, Fluor and Transurban had an investment grade T&R study completed by a third-party in 2007; hence, this indicator was fully met. Finally, VDOT did not complete business case or VfM studies for this project, so this indicator was not met.

The investor's interests relate to whether the project is attractive and progress on statutory clearances. The revenue potential is the indicator for attractiveness; it includes tolling, project characteristics, and users as depicted in Table 3-3; while tolling was not common in

NOVA, the I-495 corridor was part of a highly congested urban network, but few comparable roadways existed in the region. The improvements under consideration by Fluor were an expansion of the existing highway, and potential users were from high income groups and time sensitive (Fluor Daniel 2003). Hence, the managed lanes proposed would allow adjusting toll rates to accommodate users. Consequently, this indicator was fully met. Statutory clearances include indicators of ROW acquisition and NEPA progress. In 2002, VDOT had filed a Draft Environmental Impact Statement (DEIS), so the NEPA process was progressing. Yet, VDOT's plan for a 4-4-4-4 configuration would require significant ROW acquisition.

The last interests are those of the producer: scope of work offers degrees of freedom and baseline site conditions. For the first interest, the design flexibility remaining is the indicator, which is reflected by the advancement of design (i.e., 30%). As shown in Table 3-3, Flour proposed four general-purpose lanes and two HOT lanes in each direction, a 4-2-2-4 configuration instead of VDOT's original 4-4-4-4 configuration (Fluor Daniel 2003). The new configuration had the potential to achieve two major benefits: (1) diffuse traffic congestion and (2) reduce the footprint of the I-495 corridor improvements. Hence, degrees of freedom still existed which supported the producer's modified configuration, so this was fully met. The second interest of understanding baseline site conditions uses the potential for unforeseen conditions as its indicator. Here, the proposed HOT lanes were in the existing median of I-495; additionally, Fluor completed its own site investigations, so this interest was fully met.

A.4 Stakeholder Management

The stakeholder management performance dimension serves state, investor, and user interests in managing and communicating with impacted and interested stakeholders. This facilitates proper communication among end users, local communities, and other stakeholders and provides opportunities for involvement in the development process. Overall, it has two interests and four indicators; two indicators were fully met and two were partially met. The key interest for the state is its stakeholder management strategy that includes an indicator with two components: (1) non-mandatory engagements and (2) participatory elements such as citizen advisory committees, etc. For I-495, VDOT conducted a public hearing in May 2002 as part of NEPA approval process for its DEIS. After Fluor submitted its unsolicited proposal and the Commissioner authorized proceeding with negotiation of a comprehensive development

agreement, VDOT and the developer team of Fluor and Transurban implemented an active stakeholder engagement plan involving frequent and multiple means of interaction. Hence, this indicator was fully met. For investor and users/citizens, the interest is also stakeholder engagement with indicators of types and number of public meetings and forms of communication/engagement. As mentioned above, an active engagement approach was implemented that included numerous community engagement, public outreach, and briefings as well as a phone campaign and email updates (which continue to this day to subscribers). Hence, early and comprehensive public engagement with key stakeholders by the investor and state was done throughout the shaping phase. Finally, organized/third party involvement was not observed, which indicates no strong opposition. Hence, these two indicators were fully met.

A.5 Public Agency Capacity

The public agency capacity performance dimension considers the investor interests of government commitment and experienced/reliable agency with three indicators; all three indicators were partially met. The government commitment indicator had two elements industry forums held and types of public contributions. Here, VDOT did not hold any industry forums, but as the project's shaping evolved a public contribution towards the project was expected, so this was partially met. The indicators of an experienced and reliable agency are: (1) dedicated units for alternative delivery or P3s and (2) type and years of agency experience. VDOT did not have a dedicated unit, but an innovative project delivery division did exist; this division managed projects delivered by methods other than the conventional design-bid-build. So, the first indicator was partially met. VDOT's experience under the PPTA was limited to a single project, the development of Route 895 (Pocahontas Parkway) that was later leased to Transurban in 2006. Hence, VDOT experience was developing, although it is worth noting that they were pioneering such arrangements in the US at this time. Hence, this indicator was partially met.

A.6 Conclusion: Project Planning Performance - Enabling environment and Project Shaping Phases

Table 3-4 Project planning performance assessment

Stakeholders	*State*			*Investor*			*Producer*			*User/Citizen*			***Total***		
Dimension (Total Indicators)	F	P	N	F	P	N	F	P	N	F	P	N	**F**	**P**	**N**
Project Environment (9)	1	-	-	2	1	-	Same as Investor			1	1	-	6	3	-
Identification of Need (3)	2	-	1	-	-	-	-	-	-	-	-	-	2	-	1
P3 Determination (8)	2	-	2	2	-	-	2	-	-	-	-	-	6	-	2
Stakeholder Mgmt (7)	1	-	-	2	1	-	-	-	-	Same as Investor			5	2	-
Public Agency Cap. (3)	-	-	-	-	3		-	-	-	-	-	-	-	3	-
Total (30)	6	-	3	6	5	-	4*	2*	-	3*	2*	-	19	8	3

*Sum of individual and joint interests

The first level of performance assesses project planning, which captures the key interests of stakeholders in the enabling environment and project shaping. Table 3- 4 summarizes the five performance dimensions related to project planning and the corresponding assessment of the 30 indicators of interests by stakeholder. Overall, 19 indicators of interests were fully met, 8 were partially met and 3 were not met. Six interests of the state were fully met while three were not. Six interests of investors were met while five were partially met. Four interests of the producers were fully met, and one was partially met while for the users/citizens three interests were fully met, and two interests were partially met. Overall, the assessment illustrates that a vast majority of interests were fully or partially met.

A closer examination of the performance dimensions sheds additional light on the planning performance. The stakeholder interests in the project environment dimension were fulfilled overall thanks to the nature of Virginia's Public-Private Transportation Act (PPTA), which helped VDOT to enter into arrangements with private companies to build, develop, manage, and operate transportation facilities. In addition, the Implementation Guidelines adopted by VDOT dictated a multi-phased executive oversight process that did not require any project-specific legislative approvals, which was transparent to investors and producers who might seek to engage in potential investments. This published process also afforded users/citizens a means to hold VDOT accountable; however, the limited public engagement requirements of the PPTA itself was a potential shortcoming. Similarly, the identification of need dimension was also

fulfilled; VDOT had launched corridor improvements studies in 1997 and was promoting a 4-4-4-4 configuration to expand the corridor with four high occupancy vehicle (HOV) and bus transit lanes in both directions. Subsequently, VDOT started advancing plans for a conventional highway expansion in the early 2000s, but their plan had an estimated cost of $2.5 to 3 billion, and public opposition mounted due its large footprint and ROW land acquisition requirements. These circumstances opened the door for Fluor's unsolicited proposal with a 4-2-2-4 configuration and managed HOT lanes in both directions; this plan had the benefits of an estimated cost of $1.6 billion and significant reductions in ROW property acquisition. Fluor submitted this proposal despite some shortcomings noted in the public agency capacity performance dimension; VDOT's reliability and experience was developing, but notably Fluor and VDOT had worked together on the agency's one prior PPTA project, Route 895.

In the P3 determination and suitability dimension, most interests were fully met, but VDOT was not considering a P3 delivery for this project until it received the unsolicited proposal, so it had not explicitly considered P3 value drivers, nor did it complete any V*f*M or business cases analyses of the project to determine its suitability for P3 delivery. Instead, Virginia and VDOT relied on its overall evaluation process to ultimately conclude that working toward a comprehensive agreement with Fluor was sensible. Fluor's entry and subsequently Transurban's involvement started a joint and multi-faceted stakeholder engagement initiative, so interests in the stakeholder management dimension were also fully or partially met. Consequently, the planning performance while not flawless did meet stakeholder interests.

B. Project Management Performance

B.1 Procurement Process

The procurement process performance dimension considers three interests of the state and one each for the investors, producers, and users/citizens (see Table 3-5); in general, the procurement process is the means followed by the state to select a service provider where the goal is typically to obtain the most advantageous offer (Miller et al. 2000). This dimension includes 12 indicators of stakeholder interests; seven indicators were fully met, one was partially met, and four were not met, so overall the results in this dimension were mixed. The three key interests of the state are: (1) best value evaluation process, (2) market interest, and (3) minimize financial commitments or exposure. The indicator of the first interest is the evaluation process

and criteria. VDOT received one unsolicited proposal and no competing proposals; the process was non-competitive, so this indicator was not met. The indicators for market interest are number of short-listed teams and number of proposals received. Again, VDOT received only one proposal from Fluor, so these indicators were also not met. The indicators of minimizing financial commitments are: (1) amount and type of public contributions, (2) overall financial structure, (3) debt/equity ratio. The state's total contribution was $495 million with a public subsidy of $409 million and VDOT change-order funding of $86 million, so public contributions exceeded 20%. Alternatively, private equity invested was $348 million, which is 17% of total funding; moreover, the project included a TIFIA loan of $589 million, and the project should not impact state debt limits. Hence, this interest was partially met.

From the investor perspective, a reliable and fair process is a crucial interest. This interest has three indicators: (1) procurement and contracting guidelines in place, (2) state limits number of competitors through shortlisting process, and (3) time from notice to commercial close and commercial to financial close. VDOT's guidelines for procurement and contracting were published, so this indicator was fully met. For the second indicator, Fluor's proposal was the only one considered, so this favored Fluor's ability to secure the project; this was fully met. Finally, the duration of the procurement was quite lengthy since it took 5 years and 4 months from submission of unsolicited proposal to financial close; the period from the Commissioner's decision to proceed to negotiate a comprehensive agreement to financial close was still 3 years and 4 months. Hence, this indicator was not met. Overall, the expectation of reliable and fair process expectations fully met.

The key interest of the producer is the potential to modify scope of work to add value/reduce cost, so that their experiences and expertise can be utilized. The indicators are either an ATC/AFC process is followed or the potential to negotiate adjustments of scope exists. Since this was an unsolicited proposal, VDOT worked with Fluor and Transurban (CBE) as well as the other members of the design and construction team for 5 years to develop the design and negotiated the scope of work, leading to the reduced footprint and HOT lanes configuration. Consequently, this was fully met.

The interest of users/citizens is a transparent and legitimate process. Four indicators serve as proxies for this interest: (1) followed relevant procurement laws/regulations, (2) progress and

outcomes communicated, (3) procurement documents publicly available, and (4) rationale for selecting preferred proposer known. VDOT followed the PPTA Act and its Implementation Guidelines and apprised citizens about progress. It also posted relevant procurement documents to its website, and VDOT's Public-Private Transportation Advisory Panel outlined its support and concerns in their recommendation to proceed with negotiations in letter to the VDOT Commissioner on 6/28/2004, which was posted to its website. All four indicators were fully met.

B.2 Risk Management

The risk management performance dimension considers two interests: (1) how the major risks are allocated among the parties and (2) protecting the public interest; this dimension has two indicators, and one was fully met, and the other was partially met. The equitable allocation of risks is the interest of state, investor, and producer (Table 3-5). The indicator is the project's risk profile. The I-495 risk profile has several noteworthy characteristics. The state transfers design, construction, revenue, and O&M risks to the investor/producer. NEPA approval was VDOT's responsibility and ROW acquisition was shared by both VDOT and concessionaire (AECOM Consult Team 2007). These are generally consistent with prevailing practices, so this was fully met.

Protecting the public interest is an interest of the state and citizens/users. The indicators consider revenue sharing, limits on financial commitments by state, and concession period. The I-495 comprehensive agreement included revenue sharing between VDOT and Fluor/Transurban once financial obligations were met; in addition, VDOT incurred no obligations to repay any debt supporting the project. However, the agreed concession period was 85 years (5 years of construction and 80 years of operations); this is a very long period that locks the state into this arrangement for this duration, which over twice the length of typical arrangements (FHWA 2009). Consequently, this interest was partially met.

B.3 Project Delivery

The project delivery performance dimension assesses four interests and seven indicators; overall, six of the indicators were fully met while one was unknown. The state's interest is that the asset will be delivered on time and fit for purpose (Table 3-5). The indicators include if the project opens on time and meets major KPIs. The project opened on time with two managed lanes in each direction over roughly 14 miles and a state-of-the-art toll collection system. In

addition, the project replaced of more than 50 bridges and overpasses (Fluor Daniel 2003). The project also added direct connections between the I-495 high-occupancy vehicle (HOV) lanes and the existing I-95/I-395 HOV lanes. Here, the state's interests were fully met.

The investors interests are similar; the project should be on time and on budget. The indicators are cost or schedule overruns. The sooner the project is ready the earlier revenue can be generated. The P3 Express Lane I-495 completed in 2 months prior to contract requirement for 5 years, and ultimately met its estimated project cost of $2.06 billion (Build America Bureau 2014). Hence, this was fully met.

The producers work for the SPV during project delivery, so they are directly responsible for the project's delivery. Accordingly, their interests are effective and efficient delivery of the P3 project. The indicators of this interest are: (1) meets SPV milestones, (2) number of claims or disputes, and (3) no major accidents during construction. As noted above, the project opened 2 months ahead of deadline, so this was fully met. During construction, no claims or disputes occurred, but a change order adjusting the project scope was issued by VDOT for $125 million with no extension of time. Hence, this indicator was fully met. Finally, the producers had completed the project without any major incident through September 2012 (Lane Construction 2014); this was fully met.

The interest of users/citizens is minimal inconveniences and environmental impacts. The two indicators are: (1) major incidents during construction and (2) complaints from citizens/businesses. In I-495, no major incidents (accidents, spills, etc.) were observed; in addition, the producers sent out more than 30,000 construction notices; this indicator was fully met. However, data for complaints from citizens was unavailable, so the status of this indicator is unknown.

B.4 Conclusion: Project Management Performance - Procurement, Contract, and Implementation Phases

Table 3-5 Project management performance assessment

Stakeholders	*State*			*Investor*			*Producer*			*User/Citizen*			***Total***		
Dimension (Total Indicators)	F	P	N	F	P	N	F	P	N	F	P	N	**F**	**P**	**N**
Procurement (12)	-	1	3	2	-	1	1	-	-	4	-	-	**7**	**1**	**4**
Risk Management (6)	1	1	-	Same as state						-	-	-	**3**	**3**	**-**
Project delivery (7)	1	-	-	1	-	-	3	-	-	1	-	-	**6**	**-**	**-**
Total (25)	2	2	4	4*	1*	1	5*	1*	-	5	-	-	**16**	**4**	**5**

* The sum of individual and joint interest numbers.

The second level of performance assesses project management and considers the key interests of stakeholders in the procurement, contract, and implementation phases. Table 3-5 summarizes the three performance dimensions linked with project management and the corresponding assessment of the 25 indicators of interests by stakeholder. Overall, 16 indicators of interests were fully met, 4 were partially met, and 5 were not met. The interests of the state did not fare as well as the other stakeholder interests with two fully met, two partially met and four not met. The interests of the other stakeholders were primarily either fully met or partially met; the investor did have one interest not met. Consequently, this level had more interests assessed as unmet compared to the planning level.

Again, closer scrutiny of the performance dimensions reveals more about project management performance. Three of the five interests not met were those of the state in the procurement dimension. When Fluor submitted its unsolicited proposal in 2002, it do so in accordance with VDOT's implementation guidelines; this proposal provided VDOT with a technical solution that it had not considered, but VDOT did not receive any competing proposals, which illustrates a lack of market interest. Consequently, VDOT did not get an opportunity to evaluate multiple proposals to establish a best value process for selection. VDOT did follow its established process to conclude in 2004 that it should begin negotiations with Fluor to reach a comprehensive agreement, but it did so without the benefit of alternative proposals. Further, negotiations led to a financial structure where a $409 million subsidy was included, which was 20% of the project's total funding. Hence, the state had a large commitment toward the project. From the state's perspective, the inability to make a best-value determination and the large public subsidy were shortcomings of the procurement, albeit VDOT arguably did receive and

advance a better project than the one it was contemplating. From investor and producer perspectives, the procurement met their interests overall; the evaluation and approval process were defined and followed, and Fluor was the lone contender. The duration of the process was quite time consuming; it took over five years from submission of the unsolicited proposal to financial close. So, significant resources were expended during this process. Yet, negotiation of scope and conditions provided the investor and producer team the opportunity to add value through HOT lanes and a reduced project footprint.

In the risk management dimension, a risk profile comparable to many P3s was established, but the 85-year concession period (5-year construction period, plus an 80-year operating period) is quite long, which works against the interests of the state and users/citizens. In the project delivery dimension, all interests were fully met. Construction of the project began in June 2008, was completed ahead of schedule and on budget. Subsequently, in November 2012 the project was opened to traffic. During construction, users and citizens were apprised of conditions through regular notices, and no major incidents occurred. Overall, the project management performance dimension met many stakeholder interests, but the procurement dimension had some issues for the state given its sole-source nature.

C. Business Performance

C.1 Service Quality

The service quality performance dimension considers the interests of the state during service delivery; the state expects that service meets or exceeds expectations. The indicators for the I-495 project are: (1) service indicators such as travel speed (decrease/increase), congestion indicator/index (decrease/increase), and (2) penalties or sanctions/bonuses (Table 3-6). The HOT routes saved an average of 17 minutes during peak periods compared with the general-purpose lanes; in addition, the HOT lanes showed a 8-15% increase in HOV usage in HOT lanes (toll-exempt trips) (Transurban 2017). Hence, the first indicator was fully met. Further, no sanctions or penalties have been imposed during operations, so this indicator was fully met also.

C.2 Revenue and Operations

The revenue and operations performance dimension reflects the interests of the investors and producers during the service delivery phase. The interest of investors is return on investment,

and it includes indicators of (1) actual traffic and revenue (T&R) and (2) equity invested or divested. Initial T&R in the ramp-up period was not promising; an average of 4,974 vehicles used the lanes each workday in the quarter ending June 2013. By the end of the first year of operations, the lanes had only 40% of the projected first-year average workday traffic of 66,000 vehicles. Consequently, the developer lost over $300 million since the lanes opened in November 2012 through 2015 (PPIAF 2009a; Transurban 2017, 2018). Since 2016, however, traffic revenue has grown steadily and has exceeded expectations (see Table 3-6). Given the positive trends, this indicator was judged as fully met. For the equity investment or divestment indicator, the traffic and revenue shortfalls at the outset were less than expected. During the first six weeks of operation, Transurban estimated that the new Express Lanes lost $11.3 million due to less-than-expected traffic volume. In 2014, In order to stabilize its financial condition, Transurban found it necessary to invest an additional $280 million in equity and release $150 million of reserves. Hence, this indicator was not met. Finally, producer interest of providing expected asset performance and operational effectiveness was assessed by: (1) compliance with standards and (2) changes in oversight by the state. For both indicators, no sanctions or increased oversight was observed, so these were fully met.

C.3 Project impact

The Project impact performance dimension considers the user/citizen interest of whether the project adds expected value in the service delivery phase. Two indicators reflect this: (1) user patronage and satisfaction and (2) increases in jobs and commercial development. At its opening, traffic on I-495 was 40% of original expectations as noted above; however, traffic has increased steadily over time. From 2014-19 traffic volume increased each year; similarly, the average toll rate has increased, reflecting greater willingness to pay (Transurban Annual Reports). Further, drivers' satisfaction surveys completed by Transurban indicate a 75% satisfaction rate. Hence, this indicator was fully met. Sources indicate that the project supported 31,000 jobs and injected approximately $3.5 billion into the economy (Aument 2017). Further, the SPV contracted $490 million of work to disadvantaged businesses and small, women-owned, and minority-owned businesses. Hence, this indicator was fully met.

C.4 Conclusion: Business Performance - Service Delivery Phase

Table 3-6 Business performance assessment

Stakeholders	*State*			*Investor*			*Producer*			*User/Citizen*			***Total***		
Dimension (Total Indicators)	F	P	N	F	P	N	F	P	N	F	P	N	**F**	**P**	**N**
Service quality (2)	2	-	-	-	-	-	-	-	-	-	-	-	2	-	-
Revenue and operations (4)	-	-	-	1	-	1	2	-	-	-	-	-	3	-	1
Project impact (2)	-	-	-	-	-	-	-	-	-	2	-	-	2	-	-
Total (8)	2	-	-	1	-	1	2	-	-	7	-	-	7	-	1

The third level of performance evaluates the project as a business, and it reflects key interests of stakeholders in the service delivery phase. Table 3-6 summarizes the three performance dimensions related to business and the corresponding assessment of eight indicators of interests by stakeholder. In total, seven indicators of interests were fully met, while one indicator was not met (Table 3-6). Two interests of the state were fully met; one interest was fully met, and one was not met for the investors, while both producers and users/citizens had two interests fully met, respectively. Overall, the assessment portrays that the vast majority of interests were met with respect to business performance.

The purpose of the Express Lanes project was to improve trip time reliability and provide congestion relief. Both these goals are being achieved; users of the lanes have experienced a quarter-hour average time saving during peak periods along with improved incident clearance times. Further, the HOT lanes provide a reliable route for buses and HOVs, and HOV usage has increased. Similarly, patronage has risen since the opening of the lanes and driver satisfaction surveys are positive. In addition, the project brought new jobs and commercial opportunities into the region. Consequently, the project has met state and user/citizen expectations.

Certainly, the HOT lanes got off to a slow start; traffic in the first year was 40% of the anticipated level and remained below expected levels for the first three years. At the beginning of 2014, Transurban liquidated reserve funds and injected an additional $280 million in equity to the project on a more stable financial position. In the second quarter of 2014, usage started to show more promise as traffic rose by 20% (Reinhardt and Westfield 2014). By 2015, revenues started to meet expectations, and the average toll paid increased 6% and the lanes registered 15 million annual transactions. Subsequently, revenues have climbed. Hence, the investor has

experienced mixed results; the outset was challenging, so additional capital investment was necessary, but more recent traffic and revenue trends are favorable. Overall, the business performance has met stakeholder interests, but traffic and revenue were well below expectations at the outset for the project's investors.

D. Future Potential

Future potential level of performance evaluates trends in performance dimensions in the service delivery phase: service quality, revenue and operations, and project impact. This assessment considers the prospects of the project moving forward as well as its broader impact. The project promotes the continued economic prosperity of the region, unclogging one of the nation's busiest commuting roads and offering better connectivity to business areas such as Tysons Corner and Merrifield. The Express Lanes keep vehicles flowing smoothly on the Capital Beltway and keep traffic out of local neighborhoods (Garvin 2019). The project continues to support the region's economic vitality and has provided new options for public transit and carpooling. By hiring more than 250 contractors, more than 75 percent based in Virginia, the project contributed to promoting the industry and market capacity (VDOT P3 Office 2020). In 2018, VDOT started planning to expand the I-495 HOT lanes from its current North Terminus to state line with Maryland; the 495 Express Lanes Northern Extension (495 NEXT) environmental study was started in April of that year. The project is being closely coordinated for compatibility with improvement plans for I-495 (Capital Beltway) in Maryland.

3.5 Limitation of the study

The proposed framework is comprehensive and data intensive. In a few instances data was not available to render a conclusion. The availability of use of qualitative data poses some difficulties in making a clear conclusion. However, cross checking the data from the sources and findings from other two researchers helped to interpolate and render a conclusion.

3.6 Conclusion

While the literature has proposed frameworks for evaluating the performance of P3s, most do not go beyond developing the basis and conceptual structure of such frameworks. This effort has gone beyond that by developing a framework to try and assess key stakeholders' interests and levels of performance. Four key stakeholders were included in the framework: the

state, investors, producers, and users/citizens. Drawing from the literature on CSFs and KPIs in P3s, the key interests of these stakeholders across the lifecycle of a P3 were identified and indicators of such interests were proposed; these interests and indicators comprise the proposed P3 stakeholder's interests register. In addition, 11 performance dimensions were associated with these interests and indicators; their assessment utilizes the assessment of stakeholder interest fulfillment in the developed register. Finally, the performance dimensions were linked with planning, project management, business, and future potential levels of performance to determine how a P3 has fared in these four areas.

The framework was applied to the I-495 Capital Beltway Express P3 to demonstrate its applicability and to draw preliminary conclusions about this P3. The application illustrated that vast majority of interest of the stakeholders has been met at project planning performance. In general, the performance of project management met many stakeholder interests, but privately led procurement (i.e., Unsolicited proposal) created some issues for the state. The business performance has met the interests of stakeholders, but traffic and revenues at the beginning of the project were well below expectations. Finally, the business performance of the I 495 shows a positive trend in value creation, usage, and market interest.

The application of a new framework for capturing key stakeholder interests from a life cycle perspective provides new insight about how P3 performance can be assessed.

Chapter 4 Assessing Stakeholder Interests and Performance of Four Public-Private Partnerships Highway Projects in the United States

Abstract

Given the enduring nature of P3 transportation infrastructure, it is critical to examine the performance of P3 projects and to evaluate their effectiveness in serving all stakeholders goals and objectives. P3 literature is generally rich, but it remains thin in the area of evidence of P3 performance. This motivates the present investigation. A case study is conducted of four P3 highway projects in the United States: I-495 Capital Beltway Express, LBJ Expressway, SR 125 (South Bay Expressway), and SH 130, Segments 5 & 6, to examine the extent that state, investor, producer, and user/citizen interests are fulfilled. Each project opened to traffic between 2007 and 2016. The case study employs a framework developed in a companion study as the basis for assessing these interests for each project case and linking them with planning, project management, and business performance as well as each project's future potential. Overall, I-495 and LBJ Expressway met stakeholder interests more effectively than SR 125 and SH 130 (5&6); these two cases had stronger planning, project management and business performance. Notably, the I-495 case was an unsolicited (or market lead) proposal that followed a collaborative planning process to shape and define the project to meet mutual interests, while the LBJ Expressway case utilized a competitive best-value procurement to generate an innovative technical solution that reduced the project's cost and footprint. Whereas SR 125 and SH 130 (5&6) experienced various issues that led to their bankruptcy; the new owners of both projects have taken steps to improve their outlook. Finally, the findings presented can shift the discourse about P3 performance away from rhetoric toward evidence.

Key words: Public Private Partnerships, P3s, Case study, Cross case, I 495, LBJ Expressway, South Bay Expressway, SH 130 (5&6), Stakeholder Interest, Performance, Highways, Framework.

4.1 Introduction

Public–Private Partnerships (P3s) have been adopted globally to develop infrastructure in the past few decades, but the contemporary use of this arrangement began to emerge in the USA in the late 1990s. Promising accelerated delivery, lifecycle benefits, improved service provision, private sectors efficiencies, and new capital sources made P3s attractive to US public agencies that are facing mounting infrastructure demands and budgetary shortfalls (Hodge et al. 2007; Hodge and Greve 2011). Yet, selecting and implementing P3 transportation projects is challenging since various stakeholders have different motivations and objectives (Garvin and Bosso 2008b; Mladenovic et al. 2013a)

Performance measurement of P3 projects can help to examine whether public resources are being properly used and serve as a management tool. The need for more effective P3 projects increases the importance of performance evaluation, especially with respect to stakeholder interests and expectations. The absence of such an approach can result in reliance on anecdotal evidence, which may inaccurately represent the outcomes of these projects. Both public and private sectors are still experiencing difficulties to measure P3 performance. Performance assessment might be simplified as either success or failure. Interestingly, success is more difficult to assess than the failure; project failure can be investigated, and typically causes can be identified. Yet, capturing "success" for P3s is not as easily done since the stakeholders involved – legislative units, public agencies, users, impacted citizens, private investors, private service providers, etc. – have their various interests and expectations associated with P3 developments.

Capturing the key interests and expectations of different stakeholders plays a major role in assessing P3 performance and moving toward characterizing success. In other aspects, project performance is also influenced directly and indirectly by certain factors/drivers such as legislative provisions, business environment, project characteristics, project location, and stakeholder management are integral part of P3 development. These factors will likely impact the efficiency and effectiveness of the project's preparation, delivery, and outcomes. Also, these factors/drivers generate impacts and influence on different stakeholder interests throughout the project along with project outcomes.

The purpose of the research is to perform an evidence/observation-based analysis to assess P3 performance by examining a P3 project's life cycle and considering the perspectives and objectives of the range of stakeholders involved with or impacted by P3s.

This goal requires understanding P3 highway projects throughout its various phases so that alternative stakeholder performance objectives can be observed by considering the interests of the key stakeholders: public, private, and users/citizens.

To achieve this, the study utilizes the developed framework that incorporates individual stakeholder interests to evaluate the effectiveness of P3s by comparing projects. This framework was applied to a multiple case study of P3 highway projects in the USA that were implemented and opened to traffic between 2007 and 2012.

4.2 Literature Review

While numerous studies have examined multiple facets of P3s over the last two decades, limited emphasis has been placed on assessing performance comprehensively. A fair amount of the literature on P3s is either ideologically supportive or critical. However, systematic and rigorous evaluation of P3 performance is still in its nascent stages. Challenges come from the motivations to use P3s, the breadth of their goals and objectives, and limited evidence to assess their effectiveness.

The existing literature includes numerous studies examining influential factors or outcome indicators associated with P3s. The literature examining critical success factors (CSFs) has identified the "ingredients" necessary for P3 success while studies emphasizing key performance indicators (KPIs) have proposed "metrics" to evaluate P3 outcomes or performance. These areas in the literature are rather distinct, although CSFs and KPIs are used interchangeably in some articles. As work in these areas has progressed, this literature has evolved to consider CSFs and KPIs more holistically by broadening the factors considered to social, political, economic, and financial categories (Jacobson and Ok 2008; Jefferies 2006a; Jefferies et al. 2002a; Li et al. 2005a; Liang and Jia 2018; Ng et al. 2012a; Olusola Babatunde et al. 2012a; Osei-Kyei and Chan 2015a; Tang et al. 2015; Zhang 2005) . As Chapter 2 illustrates, articles examining CSFs and KPIs are prominent in the P3 performance-related literature.

Another area in the P3-performance related literature are studies focused on the cost and/or schedule performance of P3s. Several works have compared P3 cost and schedule outcomes to other conventional project delivery methods. Interestingly, the outcomes of these studies indicate that P3s do experience overruns on average. For example, Bain (2010) conducted a meta-analysis of construction cost performance for P3 and traditional project delivery methods in Europe. He found that the average P3 cost overrun was 13% while

traditional projects had overruns of 25%. Similarly, Ramsey and El Asmar (2015) examined the cost and schedule performance of 25 completed P3 transportation projects; if five design-build projects in their data set are excluded, P3s experienced an average cost increase of 2.81% and schedule growth of 2.58%. Their findings when compared to cost and schedule growth for projects delivered by design-bid-build illustrated superior performance. Additionally, Chasey et al. (2012) examined project performance of 12 P3 transportation projects procured in North America, two of which were in the U.S. and remainder were in Canada. These projects had an average 0.81% cost overrun and -0.30% schedule overrun. While these findings are insightful, these studies only consider one phase of a project's lifecycle, and they did not explore why P3s outperformed conventional approaches.

Recently, some studies have considered P3s more holistically by examining a project's lifecycle to assess performance (Liu et al. 2015e; d). Others have recognized that a lifecycle perspective should be used to measure the performance of a P3 project by examining its phases to replace the traditional time, cost, and quality (TCQ) metrics (Liu et al. 2016b). Liu et al. (2015) divided a P3 project into three different phases: (1) initiation and planning, (2) procurement, and (3) partnership (construction, operations, and maintenance). They developed 63 critical success factors and suggested evaluations in each phase and between the phases. However, their framework remains conceptual since it was not further investigated with data from P3 projects.

Further, some authors have developed frameworks to assess P3 performance. Garvin and Bosso (2008) proposed the P3 equilibrium framework that captures social, industry, state, and market interests. Using several case studies, their framework considered how P3s balance the interests among stakeholders, under the premise that particular actions within a project may meet the expectations of one of these stakeholders more than the others; they suggested that the effectiveness of a P3 project depends on an "equilibrium" among the parties. Subsequently, Soomro and Zhang (2016) developed nine failure drivers derived from project stakeholders, socio-economic factors, and socio-political factors along with causal relationships among these drivers to uncover the failure mechanisms of 35 selected cases. Nevertheless, this study utilized pre-defined drivers to identify the failure reasons. Yang et al. (2013) proposed a P3 framework that covered the broader spectrum of governance issues concerning transaction relationships and environments, but it did not explicitly consider public and private sector perspectives.

Jeffares et al. (2013) emphasized a theoretical basis for measuring P3 performance as partnerships. They suggested six "performance domains": democracy (democratic theory), policy goal achievement (network theory), transformation of public sector behaviors (institutional theory), connectivity to innovation (innovation theory), achieve synergies (resource dependency), and achieve sustainable partnerships (discourse theory). This work established a set of 12 principles for partnerships ranging from a clear and realistic purpose to continual engagement with others; these principles are applicable to evaluate partnership assessment tools. Likewise, (Rufin and Rivera-Santos 2012; Skelcher 2010) argued that the least examined dimensions of P3s have been legal governance, regulatory governance, democratic governance, and cooperation.

Interest in various facets of P3 performance is clear. The CSF and KPI literature has examined factors that influence or measure performance. Another subset of studies has explored P3 construction outcomes. More recently, interest has shifted toward more "balanced" and comprehensive ways to evaluate P3s – in terms of participants (multiple stakeholders vs. public/private dichotomy) and time (project lifecycle vs. project phase). Yet, studies that have examined P3 projects from the perspective of multiple stakeholders and from initiation to operations are scarce. This creates a research opportunity.

4.3 Scope of the Research

This study uses P3 highway projects as its context. Further, it follows the precedent of Garvin and Bosso (2008) as well as South et al. (2015) to consider the interests of four principal stakeholders: (1) the state – elected bodies and executive agencies that represent and govern the general public; (2) investors – participants that contribute equity and take an ownership stake in P3 project companies; (3) producers – firms or enterprises that provide services necessary for a project; and (4) citizens and users – individuals or organizations interested in or impacted by a project. Performance is characterized by examining the interests of these stakeholders to determine the degree that their interests are fulfilled. Identifying and assessing these interests can indicate P3 performance (Mladenovic et al. 2013a). Consequently, this study poses the following research questions:

- How well have principal stakeholder interests and expectations been fulfilled over a project's lifecycle?
- Why have such interests and expectations been met or not in the lifecycle phases?

- What interests or expectations were or were not fulfilled? How did prior phases influence project outcomes?
- What additional factors acted as enablers or inhibitors?

4.4 Research Methodology

The research adopts a multi-case study approach to answer the proposed research questions. Figure 4.1 illustrates the overall approach. The process involves six major components: (1) selection of cases, (2) establishment of case specific contexts, (3) employment of an assessment framework, (4) gather source data, (5) conduct interviews, and (6) within case and cross case analysis. The assessment framework employed in this study was previously developed; its details are described in Chapter 3 and its stakeholders' interests register illustrated in Table 3-1. Data were be collected from documents and archival records to populate the framework for each case. Interviews with public and private sector representatives complement this data for substantiation and triangulation. Tabulations of the data supported analyses within the cases and among the cases. Together, these six steps of analyses (i.e., gathering data and looking for patterns) facilitated identification of similarities and dissimilarities among the cases as well as keys factors by unfolding the findings within cases and across cases.

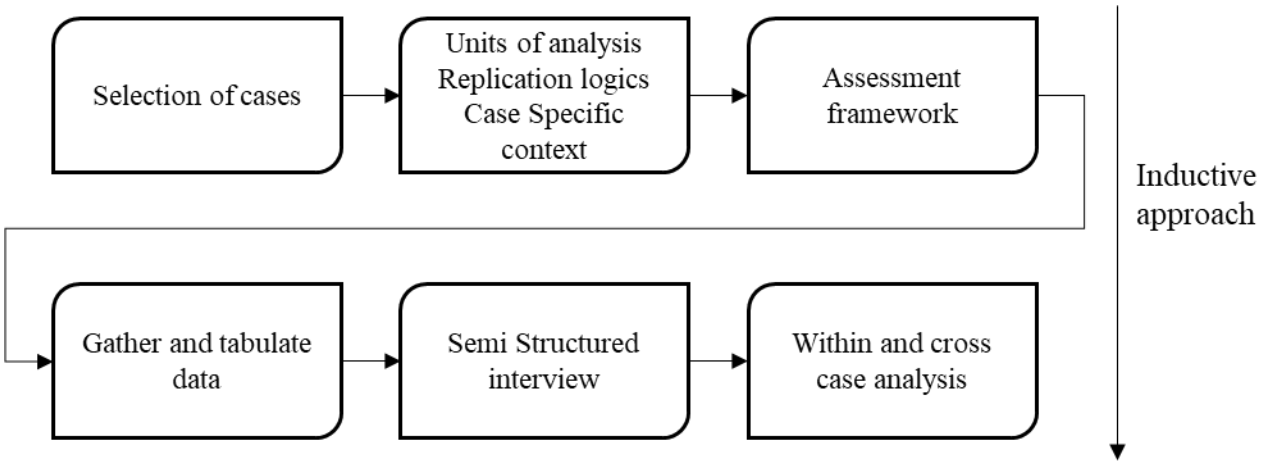


Figure 4.1 Approach for individual cases and cross case analysis.

4.4.1 Selection of Cases

Cases were carefully selected based on the overall project configuration and process to support exploring the research questions as well as providing illuminating findings related to P3 performance. The candidate cases are a representative sample of highway P3 projects in the US. All four candidates SH 130 (TXDOT), South Bay Expressway (SR125, Caltrans),

LBJ Expressway (TXDOT), I-495 Capital Beltway (VDOT) were constructed after 2000 and are in service (i.e., O&M phase) (Table 4-1) . Yet, each project is unique, so this introduces contextual differences among them.

Several factors were considered when selecting the set of cases.

- Project characteristics such as size, scope complexity, and location.
- Sector primarily initiating the project (initiative) – whether the public agency solicited proposals for the project or whether the project was an unsolicited proposal or similar arrangement.
- Project's revenue model – whether the project was a revenue risk or availability payment arrangement.
- Procurement process followed – whether the project was procured using a competitive process and the criteria for selection.
- Relationship of project with overall transportation network – whether the project is a component of a larger transportation network or more of a standalone facility.
- Project era – when the project reached financial close, went into construction, and opened for service.

Table 4-1 Case information

Project	State jurisdiction	Category	Compensation	Lease Term (Y)	Total Cost ($ Mills)	Financial close	Starting operation	Notes
SH 130 (Seg 5-6)	Texas	Arterial	Revenue risk	53	$1,328	2008	November 2012	In Operations
Capital Beltway (I-495 HOT Lanes)	Virginia	Managed lane	Revenue risk	80	$2,006	2007	November 2012	In Operations
South Bay Expressway (SR 125)	California	Arterial	Revenue risk	35	$658	2002	July 2007	In Operations
LBJ Expressway	Texas	Managed lane	Revenue risk	52	$2,645	2009	September 2015	In Operations

Based on these factors, the following projects comprise the case study set:

- I-495 Capital Beltway Express in Virginia, which is a $2 billion, 13-mile Managed Lanes project in Washington, DC metropolitan area; the project was an unsolicited proposal submitted by Fluor to VDOT as a revenue risk project and no competing proposals were received (Transurban ultimately became a partner with Fluor). It is part of a larger network in the overall interstate system in the region. Construction began in 2008 and the project opened for service in 2012.

- LBJ Express in Texas, which is a $2.6 billion Managed Lanes project in the Dallas-Fort Worth metropolitan area; the project was solicited by TxDOT as a revenue risk project that was competitively procured. It is part of a larger network in the overall interstate system in the region. Construction began in 2011 and opened for service in 2015.
- South Bay Expressway (SR 125) in California, which is a 9-mile $658 million arterial roadway in San Diego County; the project was selected through a competitive process by Caltrans as one of the four pilot projects authorized by AB 680 legislation as a revenue risk project. It is a southern extension of SR 125, so it is more of a standalone facility. Although the concession was awarded in the 1990s, construction did not begin until 2003, and the project opened for service in 2007.
- SH-130 Segments 5 & 6 in Texas, which is a 40-mile $1.3 billion Arterial roadway southwest of Austin, Texas; the project was proposed by a private consortium that negotiated a comprehensive development agreement (CDA) with TxDOT. It is a southern extension of SH-130, so it is more of a standalone facility. Construction began in 2009, and it opened for service in 2012.

4.4.2 Case Specific Contexts

A. Replication Logics

Replication is an essential element of case studies. Each case serves as a distinct experiment, which is itself an analytical unit, a case set typically has literal and/or analytical replication logics (Table 4-2). Notably, the revenue model for all four cases selected is the revenue risk model, so all the cases share this important feature.

Table 4-2 Replication logics of selected cases

Case	Project type	Procurement	Connectivity	Initiative	Era
I-495	Managed lane	Non-Competitive	Large network	Private	2008-12
LBJ Express	Managed lane	Competitive	Large network	Public	2011-15
SR 125	Arterial	Competitive*	Small network	Public	2003-07
SH 130 (5&6)	Arterial	Non-Competitive	Small network	Private	2009-12

*Caltrans solicited proposals for unique projects from the private sector and selected the top four based on a set of selection factors

[+]The private consortium that proposed SH 130 (5&6) was selected on a qualifications basis to support TxDOT with master planning of Trans-Texas Corridor; however, this consortium proposed that it develop Segments 5&6 of SH 130, and the two parties negotiated a CDA (Comprehensive .

The I-495 and LBJ Express pair primarily have analytical replication logic (Table 4-2). While similar on project type, connectivity, and era, they differ on procurement and initiative. This affords examining the impact of competitive vs. non-competitive procurements and a public or private initiative on performance. Meanwhile, the SR 125 and SH 130 (5&6) pair may appear to have primarily analytical replication logic; however, the procurement and initiative differences shown in Table 4-2 are quite subtle. The consortium selected to develop SR 125 was short-listed based on qualifications, and even though the solicitation for proposals was publicly driven, each consortium identified and proposed a unique project, and the project terms were then negotiated. Similarly, the consortium that proposed SH 130 (5&6) was selected on a qualifications basis to support TxDOT during master planning of the Trans-Texas Corridor; it elected to propose the development of this project. Subsequently, TxDOT and the consortium negotiated a CDA. Hence, the SR 125 and SH 130 pair have "near" literal replication logic. Other replication logics are possible by pairing or grouping these four projects. For instance, I-495 and SH 130 could be paired for explanatory potential related to differences in project type; they are quite similar on the other attributes.

B. Units of Analysis

Units of analysis are important aspects of this research because they help to connect key considerations and to answer the primary research questions. This research has multiple units of analysis; the principal unit of analysis is a project (i.e., a case). Within a project, its lifecycle phases are then considered a sub-unit of analysis, and within each phase key activities and principal stakeholders' interests are considered as additional sub-units. These units supported a consistent approach for each case that is both comparable and systematic – comparable because similar dimensions were investigated within the cases that enables both within and across case analysis and systematic because common features such as phases, key activities, and stakeholder interests as well as associated performance indicators are considered for each project.

C. Within Case Analysis – Assessment Framework

The framework to assess P3 stakeholder interests and levels of performance that was developed in Chapter 3 has been utilized: 1) to compile the data for individual cases, 2) to conduct within case assessments, and 3) to perform cross case analysis. As shown in Figure 2, the assessment framework (which is consolidated to only depict selected indicators) has four key elements. First, four major stakeholders have been identified; they are the state,

investor, producer, and citizens/users. Second, stakeholder interests were derived from the literature. Third, key indicators were identified for each interest in six phases P3 projects – enabling environment, project shaping, procurement, contract, implementation, and service delivery – and organized into a stakeholders' interests register. Fourth, 11 performance dimensions were defined that consider the indicators of stakeholder interests, and these dimensions were associated with four levels of performance: (1) *project planning*, which captures the stakeholders' interests in the enabling environment and project shaping phases; (2) *project management* which considers interests in the procurement, contract, and implementation phases; (3) *business* which indicates the assessment stakeholders' interests in the service delivery phase; and (4) *future potential* which is indicative of value creation and future opportunities as a result of the project.

The data to evaluate the stakeholder indicators and to subsequently determine the performance dimensions and levels of performance were collected for each of the four cases. This allowed considering how well the stakeholder interests were met in each case, which supports assessments of their respective performance dimensions and levels of performance.

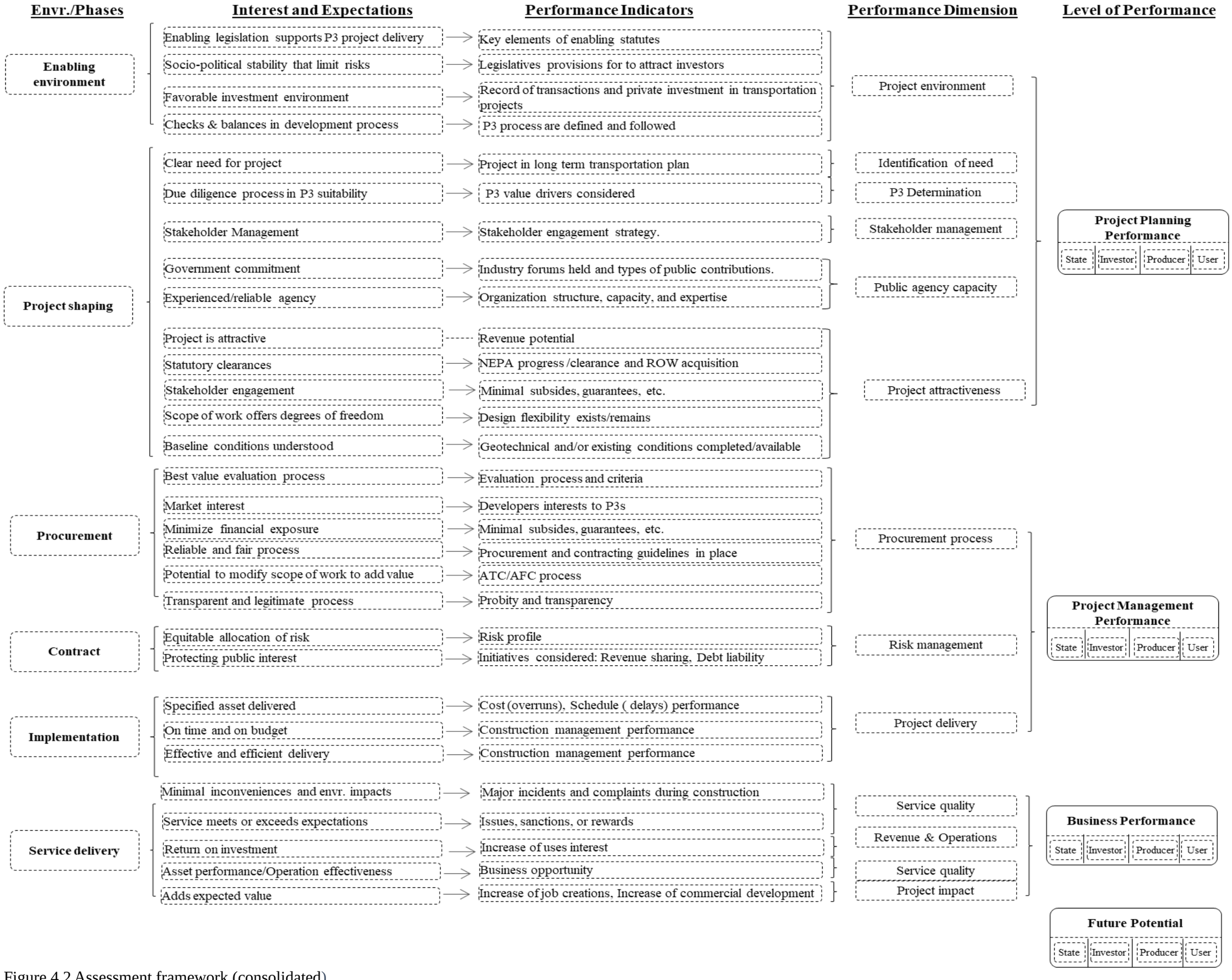


Figure 4.2 Assessment framework (consolidated)

4.4.3 Data Sources and Collection

A. Data Sources

The goals of the data collection are: (1) use of multiple sources of evidence; (2) creation of case study database using the Stakeholders Interests Register; and (3) maintain a chain of evidence. Table 4-3 demonstrates sources of data identified for each of the cases along with the specific data type.

Table 4-3 Data sources and type

Sources of evidence	Type of data
Documentation	Annual reports
	Performance reports
	Public meeting transcripts
	Press releases
	News articles (other third-party reports)
Archival records	Organizational records (public and private project management plans, proposals, procurement documentation, and contract agreements,)
	Project public records (i.e., Project's website)
Interviews	Semi-structured interviews with public and private sectors stakeholders.

B. Interviews

A total of 13 in-depth interviews were conducted for the four cases to explore the research objectives. The interviewees were provided both open-ended and specific questions based on the findings from the tabulation of the data of all four cases. As shown in Table 4-4 the study conducted five interviews for I 495 and LBJ Expressway, three interviews for the SR 125 and two for SH 130. In two instances, an interviewee provided information about two cases, so 16 total interviews were conducted with 14 interviewees. Subsequently, interviews were transcribed to explore overall perspectives of a project, to examine how projects developed, or to reinforce the available data.

Table 4-4 Interviewee information

Interviewee perspectives	I 495	LBJ Express	SR 125	SH 130 (5&6)	Total
State representative	2	2	2	1	7
PPP investor	2	1	-	-	3
PPP contractors	1	1	-	-	2
Independent interviewees	1	1	1	1	4
Total interviews	6	5	3	2	16

4.5 I 495 , VDOT, Virginia

4.5.1 Overview

The I-495 Express Lanes project is a 14-mile segment of I-495 in the state of Virginia that constructed two additional high-occupancy toll (HOT) lanes in both directions in the median of the existing corridor. The timeline of key events for the case is depicted in Figure 4.3. In addition, the P3 Stakeholders Interests Register for the project is shown in Section 8.1, which illustrates the extent that stakeholders' interests were met based on their associated indicators for the project setting and phases.

4.5.2 Project Planning Performance

In 1995, Virginia legislators enacted the Public Private Transportation Act (PPTA). This legislation authorized VDOT to enter into P3s to expedite the delivery of needed transportation improvement projects. In addition, the Implementation Guidelines adopted by VDOT dictated a multi-phased executive oversight process that did not require any project-specific legislative approvals, which was transparent and supportive of investors and producers who might seek to engage in potential investments.

VDOT had launched I-495 corridor improvement studies in 1997 and was planning a 4-4-4-4 configuration to expand the corridor with four high occupancy vehicle (HOV) and bus transit lanes in both directions. Subsequently, VDOT started initiating plans for a conventional highway expansion in the early 2000s through self-finance, but their plan had an estimated cost of $2.5 to $3 billion. In March 2002, VDOT submitted its Draft Environmental Impact Statement and conducted public hearings (see Figure 4.3). Consequently, public opposition mounted due its large footprint and ROW land acquisition requirements. As one interviewee pointed out: "There was an absolute need to do something on the Beltway for traffic, but VDOT had no money, and so they had very limited debt structure." These circumstances opened the door for Fluor's unsolicited proposal. Flour's proposal had noteworthy changes from VDOT's planning: (1) a 4-2-2-4 configuration and (2) managed HOT lanes instead of HOV lanes in both directions. This plan had the benefits of an estimated cost of $1.6 billion and significant reductions in ROW property acquisition. One interviewee commented, "We were observing the situation for a long time and waiting for the right time to submit the offer … Congestion, trip time reliability, etc. are very key issues on this Beltway. We knew that the competition was going to be very limited, so it was a good project."

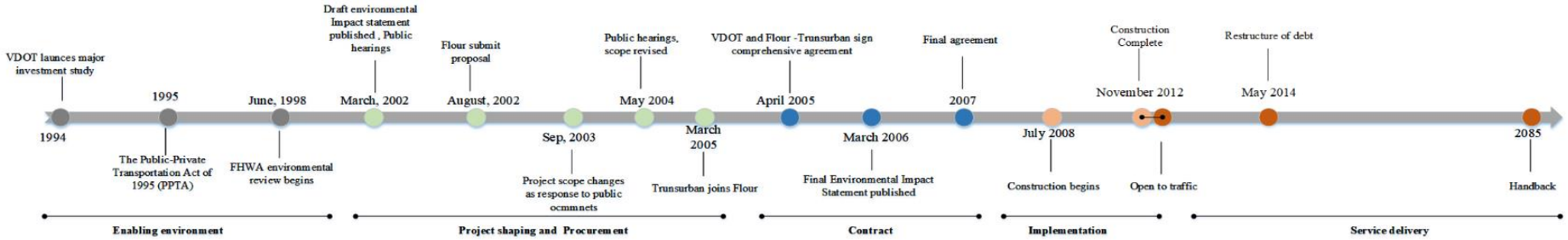
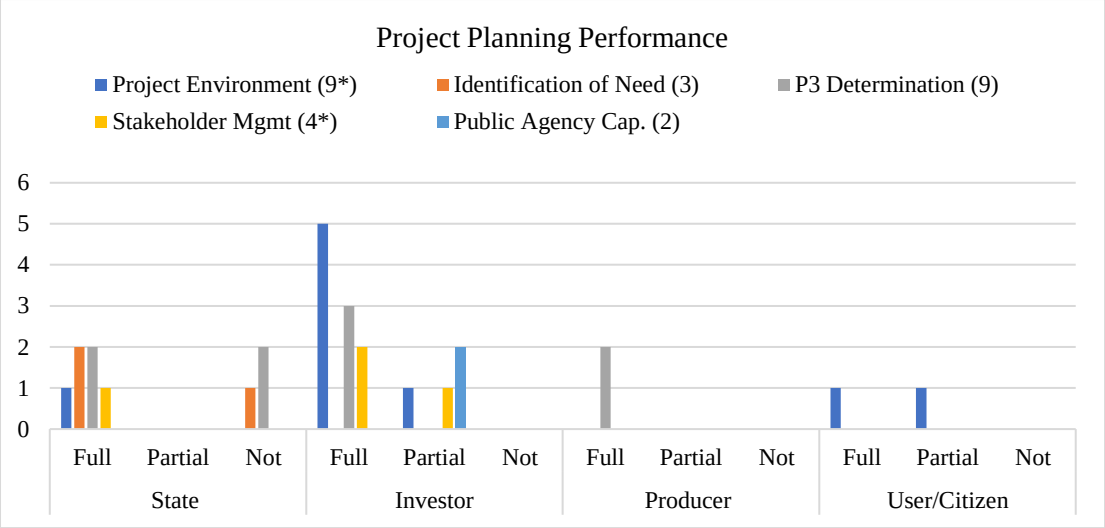


Figure 4.3 Timeline and milestones of I-495

While VDOT was considering a conventional approach despite having PPTA legislation, investors saw a project with HOT lanes as an attractive opportunity: “They had a provision in the PPTA and then VDOT implementation guidelines that allowed unsolicited or what we tend to call market lead proposals as opposed to a more traditional procurement, and that certainly supported our ability”.

Upon receiving the conceptual proposal from Fluor, VDOT followed its Implementation Guidelines; it referred the proposal to the Initial Review Committee for preliminary review and subsequently invited competing proposals. When no proposals were forthcoming within 45 days, the Commonwealth Transportation Board (CTB) approved the conceptual proposal for further evaluation. VDOT invited Fluor in July 2003 to develop and submit a detailed proposal for further review by the Public-Private Transportation Advisory Panel. Fluor submitted its detailed proposal in October 2003, and the Advisory Panel assessed it in accordance with the published Implementation Guidelines. In June 2004, the Advisory Panel completed its assessment of Fluor’s proposal and recommended to the Commissioner that VDOT proceed toward negotiating a comprehensive agreement with Fluor. Australian company Transurban joined Fluor in the negotiations in October 2004 with the intent to participate as an equity provider and O&M operator, which gave a boost to the project’s development. One interviewee noted the following about the Fluor-Transurban partnership: “we were looking for someone … they were looking for someone with capacity and the capability to do a major project and with experience in that area”. Later, VDOT signed the original comprehensive agreement with Fluor and Transurban in April 2005. VDOT was not considering a P3 delivery for this project until it received the unsolicited proposal. As one interviewee commented: “The Fluor offer was circumstantial”, meaning it was highly coincidental with the overall situation. The interviewee also pointed out that VDOT was not very experienced with private finance arrangements to develop projects at this time.



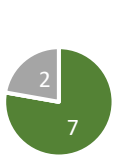
* No overlaps are counted between two stakeholders.

Figure 4.4 Dimensions of project planning performance assessment

Since VDOT was not considering a PPTA project as an option, it had not explicitly considered P3 value drivers, nor did it complete any V*f*M or business cases analyses of the project to determine its suitability for P3 delivery.

Figure 4.4 depicts the performance dimensions associated with the project planning level of performance based on the stakeholder interests register. A summary of stakeholder interests for each performance dimension is highlighted in Table 4-5.

Table 4-5 Project planning performance assessment

Summary of Stakeholder Interests Assessment			
Performance Dimension	Fully Met	Partially Met	Not Met
Project Environment 	• The PPTA legislation and the published Implementation Guidelines set the stage for submission and ultimate approval of Fluor's unsolicited proposal (S,I,P) • TIFIA program and PABs were available (I,P). • Project-specific legislative approvals were not required (I,P)	• VDOT had only implemented one prior PPTA project.(I) • PPTA Guidelines only provided affected local jurisdictions a 60-day period for written comments (S,C)	None
Identification of Need 	• The need to improve the I-495 corridor was evident (S,C) • VDOT was advancing a plan to deliver a 4-4-4-4 configuration that would add HOV/bus transit lanes in both directions using a conventional approach (S).	None	• The project was not published in a "pipeline", **but** this was not common practice in the US in this period. (S)
P3 Determination 	• Fluor was monitoring developments, and the attractiveness of a HOT lanes project prompted its unsolicited proposal under the PPTA. Subsequently, VDOT followed its Implementation Guidelines to evaluate it (S,C) • Public hearings held in May 2002 as part of NEPA approval process leading to DEIS	None	• VDOT was not considering a PPTA project for its planned improvements, so it had not explicitly assessed the suitability of a P3 (S) • No VfM studies or business case analysis completed (S)
Stakeholder Management 	• VDOT engaged the public in its initial planning; public concerns about the 4-4-4-4 configuration and public input about the potential of HOT lanes as an alternative was a factor in the project's ultimate direction (S,I,C) • Once authorized, VDOT and Fluor (and ultimately Transurban) worked collaboratively to engage the public throughout the shaping phase (S,I,C).	None	None
Public Agency Capacity 	None	• VDOT experience with P3s was developing, which potentially explains why it was not considering a P3 as an option initially; however, this did not deter Fluor's proposal submission (S,I,C)	

Discussion:

The PPTA (1995) legislation authorized VDOT to execute P3 procurements. Subsequently, Pocahontas Parkway was the first project VDOT developed under the PPTA legislation. The legislation and executive guidelines were broad and allowed both solicited and unsolicited proposals along with private financing initiatives. More importantly, the PPTA legislation set stage for what unfolded in the later events. The need for improvements in the corridor was evident; VDOT was advancing a conventional plan for delivery. One interviewee commented "VDOT was planning the project as they had issues-severe trip time reliability, they have a condition issue. There are safety issues". VDOT opted to develop a 4-4-4-4 configuration with HOV/bus transit lanes in both directions and estimated cost was $2.5 billion and planned to develop thorough self-finance. VDOT faced public opposition and less support for HOV lanes. Fluor submitted the unsolicited proposal to VDOT; both the PPTA and the agency's Implementation Guidelines enabled its submission. While VDOT's prior record with PPTA projects was limited, this was not enough of a concern to deter Fluor. VDOT had not considered a PPTA project as an option, but Fluor regarded a 4-2-2-4 configuration with managed lanes as an attractive alternative for privately led development. Transurban's entry and formation of CBE brought another source of equity and needed operational/network management expertise. Once the detailed proposal was approved for negotiation of a comprehensive agreement, VDOT and CBE worked collaboratively to define the scope and establish acceptable terms and conditions. Together, the three parties carried out an active stakeholder engagement plan to solicit public input about the project.

Overall, the project planning performance of I-495 was observed as a turning point for both VDOT, investors and citizens: VDOT was offered a feasible solution to overcome the current need. Investors got the opportunity to work toward a development agreement for the project. Certainly, Table 4-5 illustrates that the vast majority of stakeholder interests in the project performance level were fully or partially met. Yet, the project environment, in particular the PPTA and its executive guidelines, provided the foundation for the unsolicited proposal – a more feasible solution – and the collaborative planning of the I-495 improvements between VDOT, Fluor and Transurban. It clearly set the stage for subsequent developments.

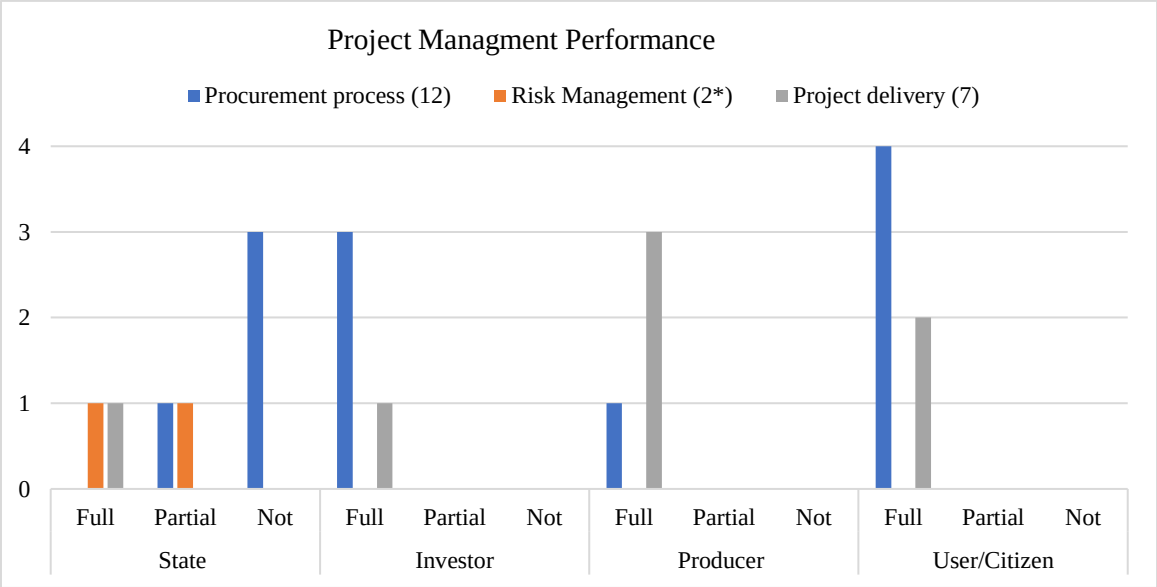
4.5.3 Project Management Performance

As noted previously, VDOT advertised for competing proposals after receipt of Fluor's unsolicited proposal in June 2002, but none were received. In July 2003, Fluor submitted its detailed proposal, and the Advisory Panel recommended further development of Fluor's detailed proposal in June 2004. Negotiations for a comprehensive agreement were initiated in October 2004. Negotiations continued over the next year, and the scope was revised. An interviewee commented: "We changed the footprint. And at the end, could we prove to VDOT that we were making the improvements that actually help the traffic flow and the gridlock on the Beltway". The FHWA approved a work agreement that authorized the negotiation of a full agreement. The initial Comprehensive Agreement to develop, design, finance, build, maintain, and operate (DBFOM) the 495 Express Lanes was signed by VDOT and Fluor in April 2005 (See Figure 4.3).

In September 2005, Fluor and Transurban formed Capital Beltway Express (CBE), LLC, both as equity partners. FHWA signed the environmental impact study of the 495 Express Lanes concept. Subsequently, the amended Comprehensive Agreement between VDOT and CBE was signed in June 2007 and financial close was achieved in December 2007 (Figure 4.3). During this period (2003-2007), the collaboration between VDOT and CBE had successfully contributed and modified the scope of the work to align with VDOT's requirements.

The agreement had several noteworthy characteristics: (1) $2.1 billion project cost with approximately 20% VDOT funding equivalent to $409 million; the balance of the funding came from 16.8% private equity, 28.5% PABs (tax-exempt bonds issued by the private concessionaire), 28.5% TIFIA loan, and 2.3% interest income; (2) project scope included upgrading and reconstructing existing bridges, traffic lanes, interchanges and signs, and an electronic toll payment system was to be installed; and (3) CBE was obligated to design, build, finance and operate the project. One interviewee commented "The majority of the construction was actually for the general-purpose lanes … we did add express lanes, but we also rebuilt all the interchanges and so much of the construction was actually VDOT roadways that would be turned over to VDOT and operated by VDOT". Consequently, construction, revenue, and operation and maintenance risks were transferred to CBE and its contractors, which is indicative of prevailing practice in P3s (Nguyen et al. 2018). While VDOT ultimately contributed nearly $409 million in public funds to the project, this provided needed capital for the general-purpose lanes improvements, and this significant level of

public commitment was somewhat offset by: (1) a revenue sharing arrangement with CBE, (2) VDOT's right to take over tolling if CBE becomes bankrupt or otherwise defaults on operational obligations, and (3) VDOT was not responsible for any debt repayment for the life of the project.



* No overlaps are counted between two stakeholders.

Figure 4.5 Dimensions of project management performance assessment

Construction began in July 2008 and the express lanes opened to the public four years later with early completion in November 2012. During construction, users and citizens were apprised by different modes of communication such as lane closures signs and email correspondence while roadway users were sent frequent construction notifications to promote safety and minimal inconvenience. Moreover, the project's construction occurred in a highly trafficked region without major accidents.

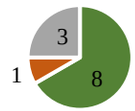
Figure 4.5 depicts the performance dimensions associated with the project management level of performance. Key aspects of each performance dimension are further highlighted in Table 4-6.

Discussion:

Though the project was privately led unsolicited proposal, VDOT followed its PPTA procedures outlined in its Implementation Guidelines and requested competing conceptual proposals. When no other proposals were received, VDOT requested a detailed proposal. Once the initial comprehensive development agreement was signed, the parties embarked on shaping and scoping the project to meet their needs. One interviewee commented: "There

were a very significant number of compromises that had to be made both in commercial terms and in price in order to close the deal with Fluor-Transurban". This indicates a key limitation in the procurement process. While Fluor's managed lanes configuration offered a more cost effective and improved technical solution to VDOT's plan, the lack of competing proposals did not give VDOT a market-based alternative to compare with Fluor's proposal. Consequently, VDOT could not confirm it as a "best-value" proposal. In addition, VDOT's initial contribution of $409 million was greater than the $348 million in private equity contributed. The risk management dimension generally conformed with prevailing practice. Such a long concession brings with it its own uncertainties, so VDOT agreed to compensate CBE if HOV usage exceeds certain thresholds. However, VDOT can receive a share of the upside – to a maximum of 40% of gross revenue – if the internal rate of return exceeds established thresholds (Garvin 2019). The project delivery dimension met budget and schedule expectations without incident. Table 4-6 depicts a similar outcome in the project management performance level with the planning performance – the vast majority of interests were fully or partially met. However, the major issue observed is that VDOT did not get an opportunity in the procurement process dimension to evaluate multiple proposals to establish a best value process for selection; this is a hallmark of public procurement (Miller et al. 2000). Without a market comparator, VDOT could only rely on its own internal planning done for the project.

Table 4-6 Project management performance assessment

Summary of Stakeholder Interests Assessment			
Performance Dimension	Fully Met	Partially Met	Not Met
Procurement Process 	• Multi step evaluation and approval process was published and followed.(S,C,I,P) • VDOT, Fluor and Transurban (CBE) worked collaboratively for 5 years to develop the design and negotiated the scope of work.(S,I,P)	• Public subsidy is relatively high (20%+) with private equity contribution of 17% (S,C)	• VDOT advertised for competing proposals under its Implementation Guidelines but none were received. • VDOT did not get an opportunity to evaluate multiple proposals to establish a best value process for selection. (I,P,C) • The process to reach financial close was very long (5 years and 4 months) (I,P)
Risk management 	• Risk profile was consistent with prevailing P3 practices (S,I,P). • Revenue sharing on base case. (S,P) • VDOT did not incur any debt liability. (S,C) • Transfer of construction risk (busy corridor)(S,P).	• Very long concession period - 80 years	None
Project delivery 	• The project was delivered on time and on budget without any major incidents. (S,P,C,I) • Very well communicated; delivered more than 30,000 construction notices.(S,P,C) • Safety performance ranks the project as one of the safest heavy civil projects.(S,C,P,I)	None	None

4.5.4 Business performance

Once opened, the project exceeded VDOT's goals for congestion relief, mobility improvements and trip reliability by creating "congestion-free" HOT/HOV lanes and adding bus transit support. An interviewee noted: "We have a requirement in the concession agreement of a minimum speed that we must maintain. Exactly that is now 65", which is an increase from the original minimum speed of 55 MPH. This allows travelers in the HOT lanes to travel twice as fast as those in the regular lanes during peak periods; moreover, the average speed observed on nearby Route 7 is 25 MPH (Office of Public-Private Partnerships 2019).

However, traffic did not materialize as expected. In the ramp up period, the I-495 project experienced less than anticipated traffic in its first three years. Surprisingly, within the first six weeks of operations the Capital Express Lanes lost $11.3 million due to less than projected traffic volume. Through June 2013, an average of 5,000 vehicles used the lanes per workday, which was 60% below the expectations (Daito et al. 2013). At the beginning of 2014, revenues became inadequate to meet all the project company's liabilities. To avoid further problems, Transurban decided to pay-down $430 million in variable-rate PABs by liquidating $150 million in reserves and contributing $280 million in corporate equity in February 2014; at this time, Transurban also purchased Fluor's stake in the project. Traffic estimates from the second quarter of 2014 showed some promise as traffic rose by 20 percent. By the end of 2014 to mid-2015, revenues started to meet expectations with an average 6% toll increase and 15 million transactions annually. Obviously, there was fear about COVID 19 impacts on revenues for I-495. Surprisingly, the impact on traffic was not as bad as expected. One interviewee commented: "The actual performance on the Express lanes pre COVID 19 has come back to relatively in line or very close to that of the original line. We were pretty well on track with the traffic alone". While a dramatic decline in tolls paid occurred when the pandemic first hit in March 2020, a slow and steady increase was observed through June of 2020 (Smith 2020).

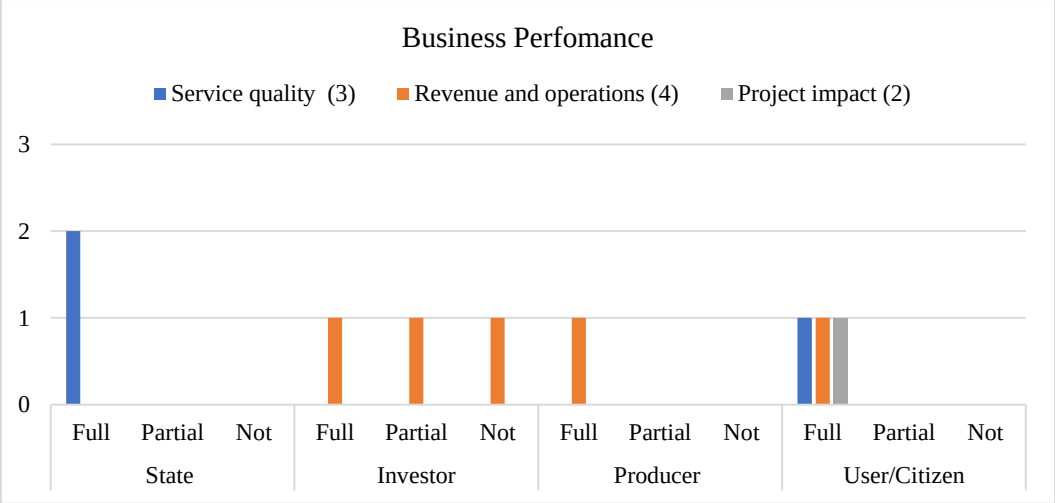


Figure 4.6 Dimensions of business performance assessment

Table 4-7 Business performance assessment

Summary of Stakeholder Interests Assessment			
Performance Dimension	Fully Met	Partially Met	Not Met
Service quality 	• Minimum speed required in HOT Lanes has increased from 55 mph to 65 mph; congestion has also decreased in the corridor. (S,C,P)	None	None
Revenue and operations 	• 2015 (Q3) onward, the revenue outlook took a positive trend.	• COVID impact on revenue (I,P)	• Traffic and revenue were 40%-60% below expectations in the ramp up period (I,P) • Detail has been in section 8.1 • Transurban infused an additional $280 million in equity and released $150 million in reserves to shore up financial situation (I,P)
Project impact 	• I-495 has fostered economic growth by opening jobs and commercial activity in the NOVA area. (I, C,S)	None	None

Discussion:

Figure 4.6 depicts the performance dimensions associated with the project management level of performance, and most interests were fully or partially met. Table 4-7 highlights key aspects of the performance dimensions. Once the project opened the minimum speed required in HOT Lanes was 55 MPH and now this has been increased to 65 mph. More importantly, the congestion has been improved in the corridor, and general-purpose lane speed has also increased. Hence, the congestion mitigation and average speed improvements align with the key project goals and objectives from the state and citizen perspectives. One interviewee commented: "Even though there has been some adverse publicity about the maximum toll rates in the peak periods. The fact is that many commuters are very glad to have the option and the ability to use those express lanes and willing to pay … and VDOT and users can get benefit using the general-purpose lanes as well the express lanes". Though the service quality and project impact dimensions have met stakeholders interests, the revenue and operations dimension has had mixed results. Once opened, I-495 experienced a severe traffic shortfall and so did its revenue. Subsequently, Transurban had to pull $150 million from project reserves and invest $280 million to stabilize the project since traffic and revenue through 2012- 2015 were not as strong as anticipated. Since, the project appears to be on more stable footing. Consequently, the business performance has generally met stakeholder interests, as illustrated in Table 4-7, but the revenue shortfall was a major issue for Transurban. This issue alone could have caused significant problems for the project, but Transurban had the financial resources and commitment to weather this challenge.

4.5.5 Future Potential

The traffic and revenue of the project has improved since the project's opening, and Transurban is still holding 100% of its stake in CBE. The project also had a very positive impact on the Washington, DC-area, and Virginia economies since its opening. From the state's perspective, the project promotes the continued economic prosperity of the region, unclogging one of the nation's busiest commuting roads and offering better connectivity to business areas. The Express Lanes keep vehicles flowing smoothly on I-495 and keep traffic out of local neighborhoods.

This project has also opened up new market opportunities. It demonstrated the potential of managed lanes to improve the transportation infrastructure both inside and outside of the capital beltway within Virginia. In 2018, VDOT began planning an extension

of the I-495 HOT Lanes from its current northern terminus to the state line with Maryland; an environmental study of the 495 Express Lanes Northern Extension (495 NEXT) began in April of that year. The project is being closely coordinated for compatibility with similar improvement plans for I-495 (Capital Beltway) in Maryland. In addition, the I-66 outside the beltway P3 project is underway where HOT lanes are under development on a 25- mile stretch of I-66. Similarly, VDOT is considering the conversion of HOV to HOT lanes inside the Beltway on I-66 (VDOT 2020). Further, upcoming P3 projects in Washington DC and Maryland are adopting HOT/managed lanes as followed in the I-495. Maryland DOT is in a process of developing Phase 1 (I 207 and I 495 Maryland part) as P3. One interviewee noted: "There are some things that are similar from I-495 that continue today. Maryland DOT just calls it a progressive design or a progressive P3, but really, it's a pre-development agreement similar to what VDOT followed". Another interviewee added "Maryland is talking about, at some point in time, doing the rest of the Beltway; Virginia, is considering extending the I-495 express lanes around the southern edge to the Wilson Bridge … if [Maryland DOT] is going to increase capacity in the Washington region on a roadway, it is going to be some sort of managed lanes". Clearly, I-495 was a harbinger project for the state, region and industry as one interviewee confirmed: "I-495 is the 'poster child' to the current P3 industry in the USA".

4.5.6 Conclusion

This case study examines I-495 in the four levels of performance. Figure 4.7 provides a cumulative portrayal of the extent of stakeholder interest fulfillment: 41 interests were fully met, 8 were partially met, and 7 were not met. In particular, the I-495 case illustrates the significance of a project environment that provides flexibility for P3 implementation and collaboration among key stakeholders that ultimately led to the outcomes observed; when asked about the project's overall performance, one state representative remarked: "I-495 was a long overdue project, we successfully transferred the risk, maintained VDOT's ratings and finally GP lane improvements occurred". However, I-495 was not flawless; it lacked a best-value procurement and experienced financial challenges. Yet, the evidence depicts a project that has fulfilled stakeholder interests and stands as a benchmark.

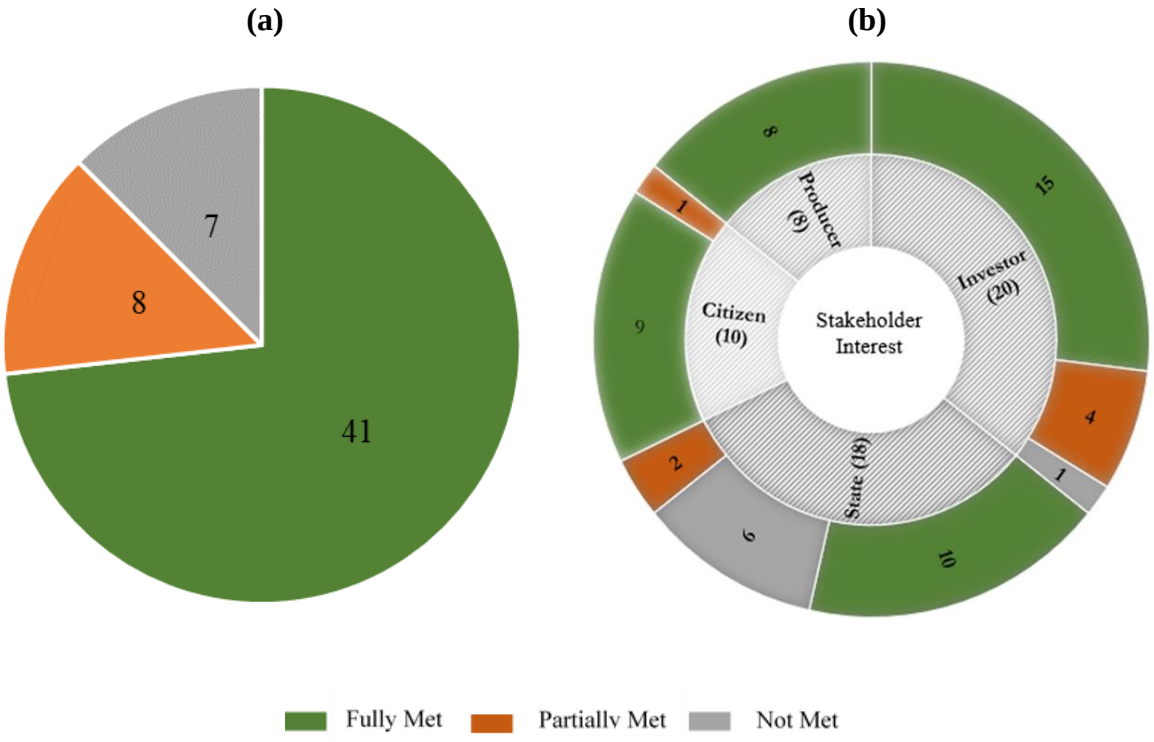


Figure 4.7 Assessment of stakeholder interests: (a) cumulative and (b) by stakeholder

4.6 LBJ Expressway, TxDOT, Texas

4.6.1 Overview

The LBJ Express (formerly the IH 635 Managed Lanes Project) in Dallas, TX includes the addition of six managed lanes in the median along 13 miles of I-635 (LBJ Freeway) from just west of I-35E (near Luna Road) to just east of US 75 (near Greenville Ave.), and south on I-35E from I-635 to Loop 12. It was constructed on one of the busiest highways in north Texas. The timeline of key events for the case is depicted in Figure 4.8. In addition, the P3 Stakeholders Interests Register for the project is shown in Section 8.3, which illustrates the extent that stakeholders interests were met based on their associated indicators for the project setting and phases.

4.6.2 Project Planning Performance

In 2003, the Texas State Legislature enacted HB 3588 that authorized certain public agencies in the state to enter into transportation P3s using Comprehensive Development Agreements (CDAs). The authority granted was broad: (1) to access private sector financing, (2) to enable the Trans-Texas Corridor (TTC-35) Plan, and (3) to authorize CDAs for both solicited and unsolicited P3 proposals for TxDOT, Toll Authorities in the state, and Regional Mobility Authorities. Subsequently, on May 2005, the Texas State Legislature passed HB 2702, which clarified certain provisions of HB 3588 regarding P3s in the state to promote the development of toll roads in Texas, including the TTC program, as well as adding requirements for public referendums about converting roadways to tolled facilities (AECOM 2007a). This legislative and regulatory environment provided the platform for TxDOT (and other public agencies) to attract potential investors and producers for the development of P3s.

Once built in 1969, IH-635 was carrying 180,000 vehicles per day. Strong regional activity and growth in the Dallas area during the 1980s pushed TxDOT to evaluate options to tackle IH 635 congestions. During the MIS study, in the mid-1990s, TxDOT evaluated a number of proposed designs to identify a suitable option. In 1992, TxDOT planned for IH 635 expansion including two additional general-purpose lanes (from 8 to 10), 2 HOV lanes, and 4 elevated managed lanes. This plan would have affected many properties and businesses. Consequently, TxDOT shelved the plan; in 1996, a tunnel approach was introduced that would add six managed lanes underground. One interviewee commented: “LBJ Expressway is part of the complex network and I believe Texas DOT has to develop the

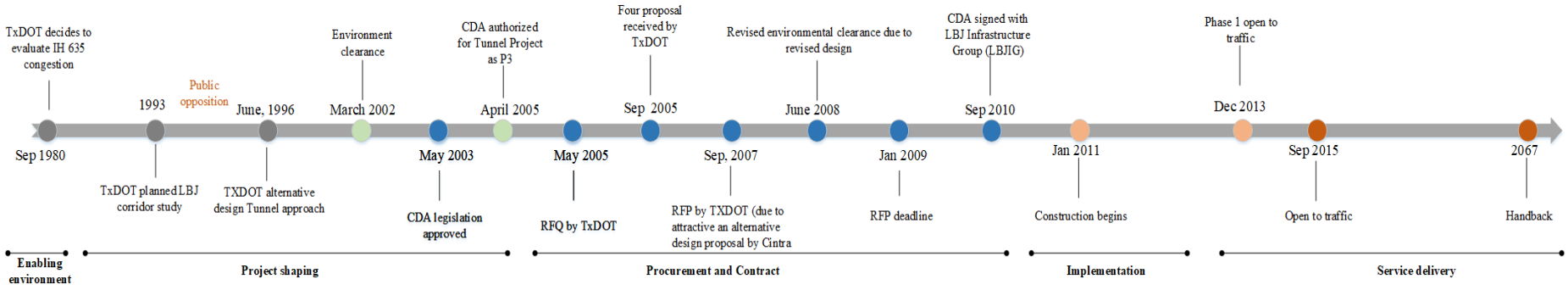
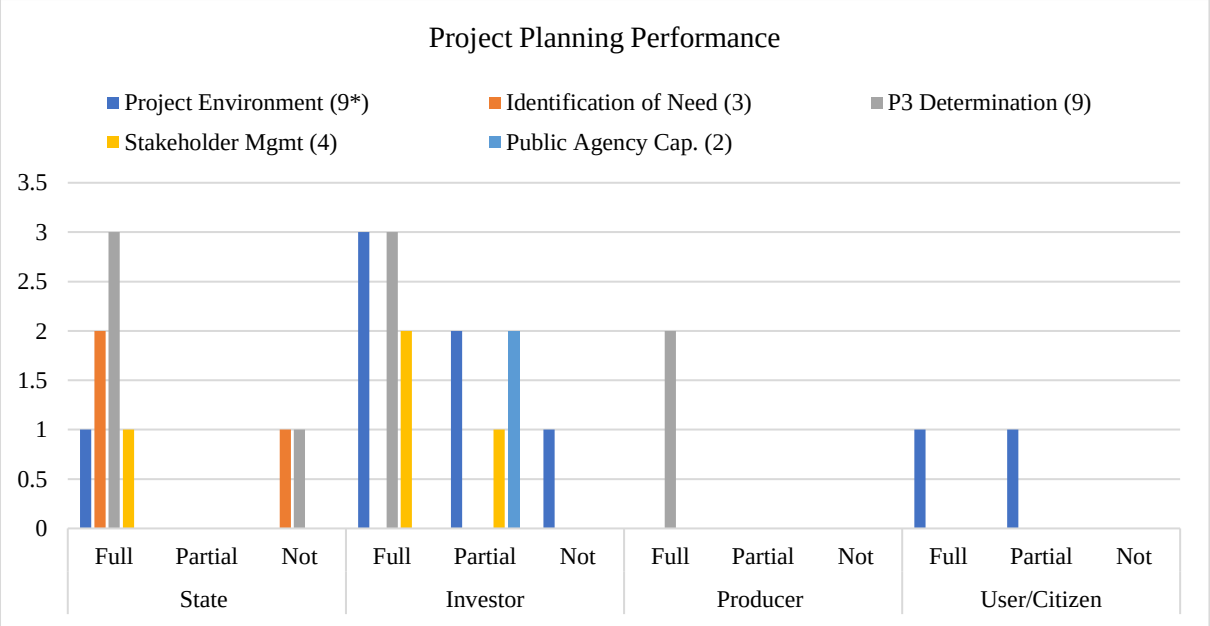


Figure 4.8 Timeline and milestones of LBJ Expressway

project to have a better integration around the I-65 and to improve the system integration around the neighborhoods as it creates better mobility for everyone."

Based on this plan, TxDOT initiated design in early 2000, and it received environmental clearance in 2002. TxDOT kept assessing the estimated cost for the project, which stood at approximately $ 4 Billion (Lovell 2010). TxDOT considered a conventional approach to deliver the project incrementally as public funding was available. Around this time, HB 3855 was passed, which authorized TxDOT to consider P3s under CDAs. By 2003, TxDOT had successfully managed to acquire a small portion of the funds from state and local sources. Meanwhile, both traffic and congestion on IH 635 were increasing and sufficient funds were unavailable, so TxDOT began to seriously consider a P3 approach. One interviewee commented: "We are only allowed to utilize the tools that are available to us in this and the tool of the P3 was available to LBJ, so I was trying to accelerate a delivery for a project where the funds were insufficient on our end." In April 2005, the Texas Transportation Commission authorized TxDOT to issue an RFQ for organizations interested in developing the LBJ expressway project through CDA. In its planning of the improvements to IH-635, TxDOT had conducted numerous public meetings and established the LBJ Executive Board to communicate with the general public impacted by LBJ (USDOT 2010). An interviewee added: "There is a rigid environmental process that gets followed and one of the district's key functions is to reach out to stakeholders and communities to ensure they understand".

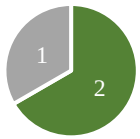
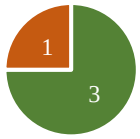
When TxDOT received authorization to pursue the project as a P3 in 2005, it was considering CDAs for two other P3 projects: (1) SH 130 (5& 6), which achieved financial close in March 2007 and (2) North Tarrant Express which reached financial close in June 2009. Hence, TxDOT's experience with P3s was still developing. Figure 4.9 depicts the quantification of interests among stakeholders in five performance dimensions associated with the project planning level of performance and the summary of stakeholder interests are found in Table 4-8.



* No overlaps are counted between two stakeholders.

Figure 4.9 Performance dimensions of project planning performance

Table 4-8 Project planning performance assessment

Summary of Stakeholder Interests Assessment			
Performance Dimension	Fully Met	Partially Met	Not Met
Project Environment 	• House Bill 3588 (2003) authorized TxDOT to procure transportation P3s using CDA– both solicited and unsolicited proposals.(I,P) • Subsequent amendment by HB 2702 clarified certain provisions to expand CDA authority (I,P) • Project-specific legislative approvals were not required. • TxDOT had established and published a four-phase selection/evaluation process (S,I,C)	• TxDOT experience with CDAs was developing with SH-130 and NTE progressing	None
Identification of Need 	• Need to alleviate existing congestion, meet future travel demands and improve safety were evident (S,I,P). • TxDOT planning initiatives had settled on tunneled lanes within the existing median (S,C) • Due to lack of funding TxDOT was unable to develop (S,I,P)	None	• The project was not published in a "pipeline", **but** this was not a common practice in the US in this period. (S)
P3 Determination 	• Lack of funding and interest in accelerating the project led to authorization of CDA by Texas Transportation Commission • TxDOT performed T&R studies, surveys. • Toll is common in the area, urban setting, highly congested and high-income users (I/P) • TxDOT led the environmental permit with the developer providing all supporting documentation and studies as required.(S,I,P)	None	• During P3 determination, no VfM analysis conducted.
Stakeholder Management 	• TxDOT conducted 4 public hearings.(S,C) • Citizen support observed (S,C,I)	None	None
Public Agency Capacity 	None	• TxDOT was considering CDAs for two other projects the time LBJ was authorized to follow this route (I/P).	

Discussion:

In the project environment, HB 3588 passed in 2003 authorized TxDOT to execute P3 procurements through CDA. Subsequently, TxDOT utilized CDAs for both SH 130 (5&6) and NTE projects. The legislation is broad and allowed both solicited and unsolicited proposals along with private financing initiatives. With rising levels of congestion along IH 635 in Dallas, a clear need to improve the corridor was evident. One interviewee commented: "We had a very heavily congested corridor that had really outlived its lifespan as far as geometric elements and safety, so we needed to reconstruct that, but funding definitely was a challenge, so we didn't have the funding available, but with our managed lanes here in North Texas, our goal with our toll managed lanes in North Texas is really to provide a reliable trip". TxDOT had considered multiple configurations to improve IH-635, but by early 2000 it was advancing a plan for tunneled lanes to improve the corridor through self-finance. It received environmental clearance in 2002. Yet, TxDOT was only able to secure a portion of the funds needed to develop the project. One interviewee noted: "CDAs were an option for us, and so by going the concession route, that allowed us to deliver the projects much earlier than if we were to sit around and wait for public funding to become available". Subsequently TxDOT decided to utilize CDA to construct LBJ as a P3.

Overall, Table 4-8 illustrates that most of the stakeholders' interests were fully or partially met. The project environment, in particular the CDA legislation, supported resolving this long-standing problem by providing the option to deliver LBJ Expressway as a P3. State officials expected that a P3 approach would accelerate project delivery compared to conventional delivery; this was a driving factor towards the project's development. Hence, this decision altered both the timeline, structure and trajectory of the project.

4.6.3 Project Management Performance

TxDOT issued a Request for Qualifications (RFQ) in May 2005 to determine the private-sector's interest in and to identify qualified teams for the project. Four responses were received in September 2005. TxDOT qualified all four teams for the subsequent Request for Proposals (RFP) phase. In September 2007, TxDOT issued its RFP, which outlined its overall evaluation process and best value determination. The best value determination was a total proposal score = price score (maximum 80 points) + technical score (max. 20 points). The price score was determined as follows:

- Price score = ((FR/O - $1 billion) * 80 / (BR/O - $1 billion)

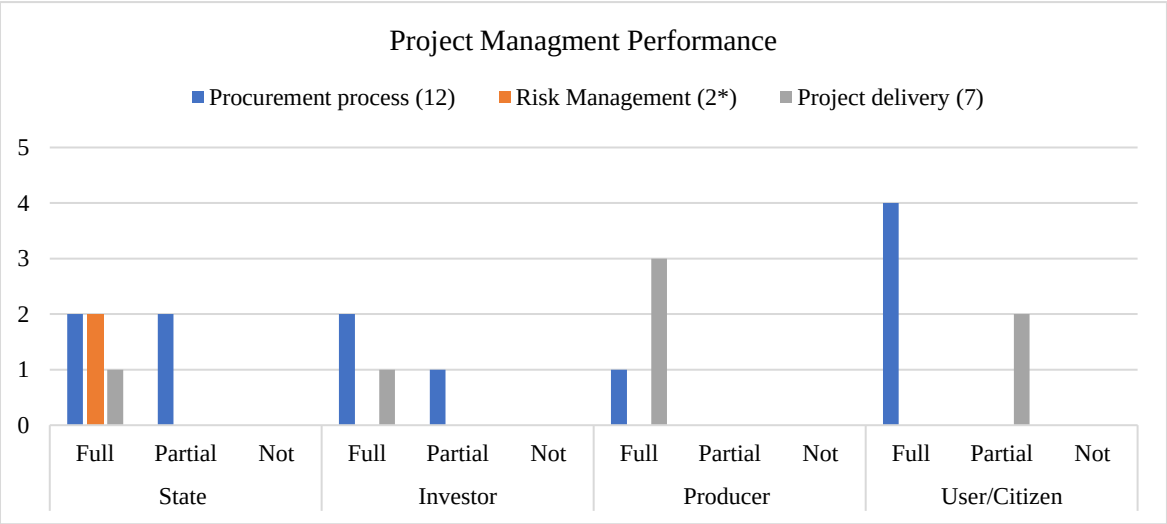
- Where: FR/O was the net present value of the proposer's public funds request or the concession payment offer as applicable and BR/O was either the highest concession payment offers or if no concession payment offers were received, then the lowest net present value public funds request.

Ultimately, TxDOT received two proposals and evaluated them by the end of February 2009; it declared that LBJ Infrastructure Group (LBJIG) provided the best value to the state; the LBJIG proposal made a public funds request of $445 million. Two key aspects are evident; (1) TxDOT used a competitive process and a best value procurement approach, and (2) the procurement process demonstrated market interest. The procurement followed a two-step process, and the evaluation method and terms of the CDA were published in the RFP; this provided clarity and reliability for the participating consortiums. The LBJIG proposal was observed as innovative in design and construction, generating cost savings, operations and maintenance effectiveness compared to the tunnel plan of TxDOT. LBJIG proposed constructing the managed lanes as an open trench rather than in tunnels while cantilevering the existing general-purpose lanes above them.

The LBJ Express financing was closed in June 2010. Ultimately, TxDOT contributed $490 million in public funds while $2.155 billion was arranged by LBJIG; private equity contributions of LBJIG were $682 million, with 51% from Cintra, 42% from Meridiam and 7% from the Dallas Police and Fire Pension System. One interviewee commented: "The commercial and financial terms with regard to the contract is to transfer the risk. So that is our general approach that was authorized to us by the state legislature". The financial arrangement demonstrates that the competitive procurement reduced the public funds exposure by roughly $500 million ($1 billion - $490 million). Further, TxDOT shifted design risk, construction risk, revenue risk, and O&M risk to the concessionaire that is consistent with P3 general practice. Further, TxDOT did not incur any debt liability for the development of LBJ expressway. One interviewee noted: "The developer has a whole series of risks. They have traffic risks, construction risks, maintenance cost risks and technology risks, all that's been transferred to them."

Construction started in 2011 and the project (four segments) was delivered on time and on schedule. The full project was opened to traffic in September 2015. Ferrovial (the prime contractor of the project) indicated LBJ was a safe project with no major incidents. One interviewed noted: "We had a thriving environment solving a problem and working with TxDOT, we were well connected and a as a public counterpart, TxDOT worked

simultaneously and showed their commitment too". This indicates the mutual understanding and solid relationship between the producer and TxDOT during procurement and project construction. However, some issues occurred during construction, residents filed a lawsuit for compensation of an estimated amount of $60 million for property damage during construction and the decision is pending.



* No overlaps are counted between two stakeholders.

Figure 4.10 Project management performance assessment.

Table 4-9 Project management performance assessment

Summary of Stakeholder Interests Assessment			
Performance Dimension	Fully Met	Partially Met	Not Met
Procurement Process 	• The procurement followed a two-step RFQ and RFP process (S,I,P,C) • Four consortiums pre-qualified and two submitted proposals. • TxDOT successfully implemented a competitive, best value approach (S,C) that was clear and reliable (I,P) • ATC process included in RFP (S,I,C) • Procurement process and outcome communicated. • Procurement documents publicly available(S,C)	• The procurement process was relatively long (2005-2009), which created higher transaction costs for the investors and producers. (I,P)	None
Risk management 	• TxDOT will not incur any debt liability through the concession period in the event project failure.(S,C)	• TxDOT were not able to arrange sufficient fund for LBJ but contributed $490 for the development (S,S,C).	None
Project delivery 	• The innovative design and construction were completed on time and on budget in busy corridor (I,P,C)	• Over two hundred homeowners sued the contractor, demanding a total compensation of up to $60 million; suit is still pending. (P,C)	None

Discussion:

Figure 4.10 depicts the quantification of indicators among stakeholders interests in the three performance dimensions associated with the project management level of performance and the summary of the assessment of stakeholder interests details is found in Table 4-9.

LBJ expressway was a publicly led procurement process. Following its CDA procedures and competitive two-step process, TxDOT selected Cintra-Ferrovial as the concessionaire. The tendering process showed market interest and four consortiums participated in the bidding process and ultimately two consortia submitted proposals. The competitive procurement approach had three major outcomes: (1) established the best value approach while selecting the bidder, (2) resulted in an innovative technical solution and (3) reduced the public contribution. One interviewee commented: “There is a factor when you decide the best values, but we give them a 30% design. I think then innovation is important”. However, the financial close of LBJ Expressway was held in June 2010, five years after initial RFQ, which is relatively long, and project estimated cost remained the same.

The risk arrangement of the LBJ Expressway project management for the project risk profile was consistent with prevailing practices of P3 risk arrangements. Most notably, TxDOT has a revenue sharing on base case and TxDOT will not incur any debt liability through the concession period in the event project failure. TxDOT supported the concessionaire by providing the necessary right of way; an interviewee commented: “In LBJ express, TxDOT bought all the right way in advance of signing the concession agreement”. The project has a 52-year long concession period; seemingly a long period could potentially impact (economic recession, pandemic, new technologies the outcome.

In the case of project delivery, the construction of LBJ expressway began in 2011 and was completed in 2015 within the scheduled time and budget. An interesting observation is that the developer designed the project following the existing right of way and converted the tunnel design concept to a cantilever design. One interviewee commented: “Our original plan for the managed lanes was to tunnel it, and so Cintra’s plan did not change the right-of way footprint. They just put it up rather than put it down.” Overall, the outcome reflects cost certainty and developer's capacity which captures a key milestone for project outcome from the TxDOT, investors, LBJIG and citizen perspectives.

In conclusion, it is evident that these results positively influenced the project outcome and met the stakeholder interest assessing project management performance level of LBJ Expressway.

4.6.4 Business Performance

The facility is located strategically in a congested area in the north of Dallas and near the airport of the Dallas-Fort Worth area. Once the project opened completely, usage in both the general purpose and managed lanes was indicative of the need for the expansion. With an average daily traffic of more than 450,000, the LBJ project almost doubled road capacity on one of North Texas' busiest roads. Furthermore, traffic demand generated the expected revenues for the investors. One interviewee commented: “Actual revenue is pretty much in line with what we forecasted”.

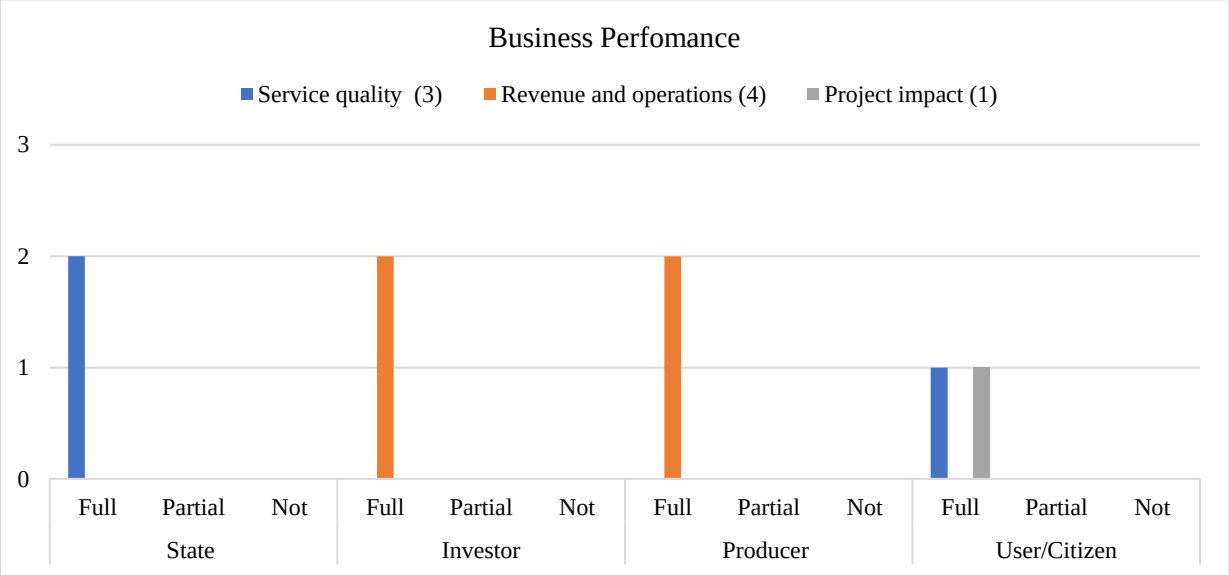


Figure 4.11 Future potential performance assessment

Drivers have the option of traveling without charge along the newly reconstructed highways and frontage roads. The rate of customer satisfaction on both the managed and general-purpose lanes increased from 46% in 2013 to 76% in 2016 (Bolaños et al. 2017). Users can also enter the managed lanes (known as the TEXpress Lanes), which have variable tolling to ensure a steady flow of traffic at a speed of at least 50 mph. One interviewee commented: “TxDOT authorities are precisely adding capacity to the roads that are feeding LBJ. We are adding capacity on I 635 E, gathering more capacity on I-35 E and on LBJ itself”. It provides a fast, safer, and more reliable source of mobility and therefore supports

the local and regional economy. Fitch ratings rated a recent refinancing of LBJ Managed Lanes' PABs Series 2020A and 2020B at BBB- with Outlook Stable.

Like all managed pathways, COVID-19 and related social and economic shutdowns and restrictions imposed by various levels of government have severely affected LBJ. The traffic losses peaked at 68% in April, but improved in June and July, to 42% and 39% respectively with reduced restrictions and economic recovery.

Table 4-10 Business performance assessment

Summary of Stakeholder Interests Assessment			
Performance Dimension	Fully Met	Partially Met	Not Met
Service quality 	• LBJ became an integral part of TxDOT traffic network by providing congestion relief and mobility (S,U) • Multiple and easy access from GP lane and to managed lane enhances user satisfaction (U,I,P)	None	None
Revenue and operations 	• Since the project opening, traffic and revenue are showing positive trend (I,P) • No financial distress observed to date (I,P)	None	None
Project impact 	• Both TxDOT and LBGIJ claimed that the project has generated direct and indirect input to 1.6 B contribution and 70,000 jobs across the economy(U/C)	None	None

Discussion:

Figure 4.11 depicts the performance dimensions associated with the business level of performance; the summary of stakeholder interests is found in Table 4-10. Once the project opened the minimum speed required in the HOT Lanes was 55 MPH and now this has increased to 60 mph. More importantly, the congestion has improved in the corridor (60% percent overall reduction) and the general-purpose lane speed has also increased (TxDOT 2018). One interviewee commented: “People also prefer to drive in a traffic flow that is not as congested, even if it is going at the same speed. People prefer to drive with a lower percentage of trucks. People prefer to drive on a highway that is cleaner, that has wider shoulders and that has fewer entries and exits because that way you do not have as much with it. LBJ offers all these utilities”. Until now the project has not experienced deficits in traffic and revenue. Overall, these results from different performance dimensions positively influenced the business performance level of LBJ Expressway. With stakeholder interests being fully met, LBJ Expressway has experienced strong business performance, and the project's outlook remains strong.

4.6.5 Future Potential

In the highly developed IH 635 corridors, LBJ Expressway is serving the purpose for which it was built – congestion management. Adopting the P3 approach helped TxDOT to develop the project with investor and producer interest to build the project. While adding the managed lanes, the project also rebuilt the existing mainlines which is accommodating 15% more traffic and 10% more speed in the general-purpose lanes. One interviewee commented: “Texas is growing so fast, and the region is thriving economically and in population … Before LBJ, the roadway was a very congested highway. It was demanding and crying for a fix. Then, the project link is well connected. It's very important for connectivity”. The recent trends suggest the average population and employment growth in the Dallas-Fort Worth region will grow, and therefore sustain or grow traffic. Consequently, it appears that LBJ Expressway will continue to generate positive impacts and outcomes for all the stakeholders.

4.6.6 Conclusion

The case study considered the LBJ Expressway in four levels of performance. Figure 4-12 depicts the extent of stakeholder fulfillment across all performance dimensions: 42 interests were fully met, 11 indicators were partially met, and 3 were not met. TxDOT pursued the project in the 1990s through the early 2000s, but the project’s objectives were

achieved through P3 procurement. Two hallmarks of this case are the accelerated delivery that a P3 afforded, and the innovative less costly technical solution obtained through the competitive procurement process. One interviewee noted: “LBJ Expressway directly leverages TxDOT to build more lanes and can put more cars on the highway”. In other words, the managed lanes solution of this P3 approach provided needed additional roadway capacity, accommodating both those willing to pay for the trip and those who prefer the general-purpose lanes. A state representative summed up the outcome: “We have got a reliable trip, so the project is doing exactly what we wanted it to do … the new facility meets current geometric requirements and increased network efficiency”. Overall, the evidence is indicative of a project that fulfilled stakeholder interests and demonstrated how P3s can accelerate the delivery of needed additional capacity and reduce expected costs through innovative design.

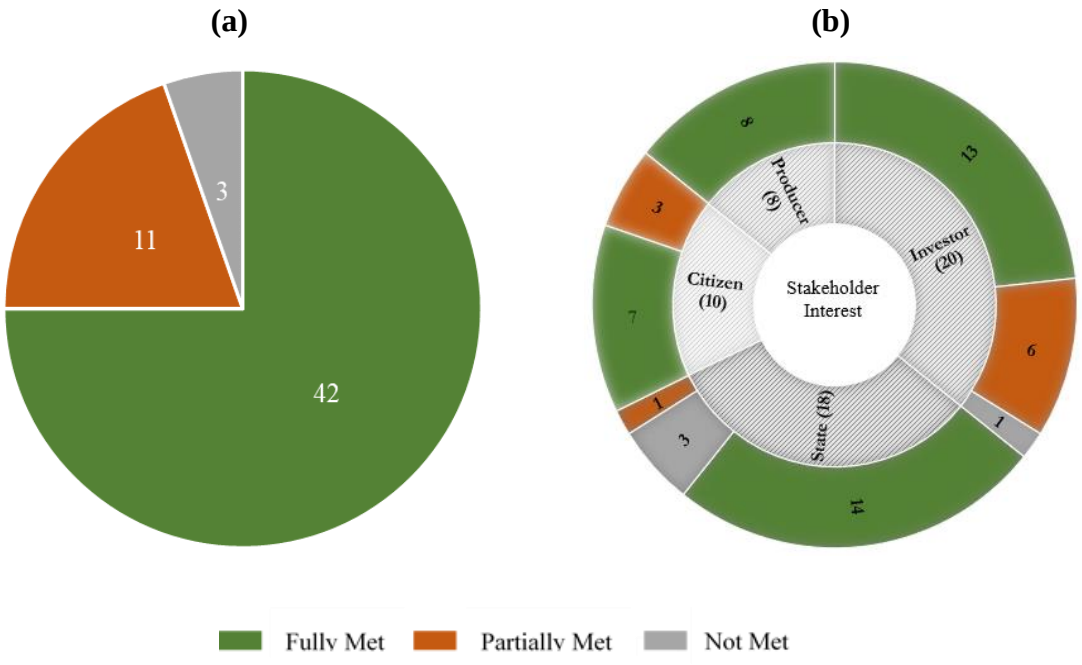


Figure 4.12 Assessment of stakeholder interests: (a) cumulative and (b) by stakeholder

4.7 SR 125 (South Bay Expressway), Caltrans, California

4.7.1 Overview

The SR 125 project, which ultimately became known as the South Bay Expressway, was one of the first P3s in California, developed pursuant to California's AB 680 legislation passed in 1989. This was also the first toll road in the San Diego region. The timeline of key events for the case is depicted in Figure 4.13. In addition, the P3 Stakeholders Interests Register for the project is shown in Section 8.3, which illustrates the extent that stakeholders interests were met based on their associated indicators for the project setting and phases.

4.7.2 Project Planning Performance

In 1989, the California legislature enacted AB 680—one of the first legislative initiatives for transportation P3s, to authorize four "demonstration" P3 projects. AB 680 had some notable features in that it: (1) enabled private sector companies to pursue transportation projects in California, (2) provided an opportunity for the potential private partners to earn a "reasonable profit" and (3) provided a framework to regulate concessions and to test the concession model to deliver infrastructure. However, AB 680 was limited, authorizing only four P3 pilot projects throughout California.

Some form of SR 125 had been a part of California's transportation plans since the 1950's. In 1976, when financing for the project could not be identified, SR 125 was removed from the state highway system plan. Later in 1984, the San Diego Association of Governments ("SANDAG") added SR 125 to its Regional Transportation Plan, but as before, funding to develop the project was never identified. SR 125 was considered a missing link in the San Diego freeway network since it would provide direct access to the US-Mexico border crossing. Hence, an apparent need for the project existed, but funding its development was unclear.

AB 680 changed this circumstance. In 1989, Caltrans was directed to solicit proposals from the private sector to develop up to four transportation projects. Caltrans planned for a franchise agreement for a 35-year period with the selected developers as franchisee. Once selected, the franchisee had full responsibility to complete ROW acquisition and environmental permitting before proceeding with development. Given the nature of the approach adopted in California, Caltrans could not perform its own due diligence since the

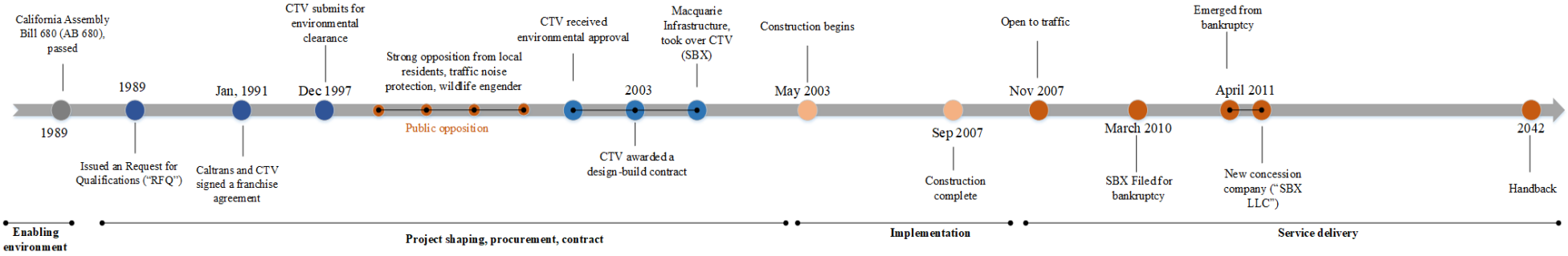
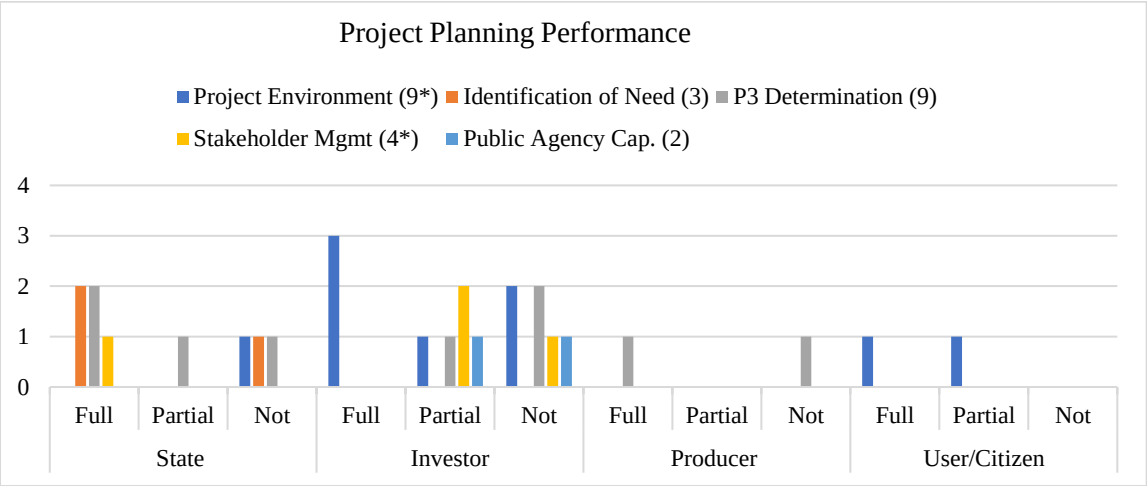


Figure 4.13 Timeline and milestones of SR 125

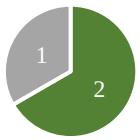
private respondents were proposing projects of their choosing. By the time SR 125 reached financial close, Caltrans had implemented one of the four AB 680 projects - SR 91; hence, it had some experience with these arrangements.



* No overlaps are counted between two stakeholders.

Figure 4.14 Dimensions of project management performance

Table 4-11 Project planning performance assessment

Summary of Stakeholder Interests Assessment			
Performance Dimension	Fully Met	Partially Met	Not Met
Project Environment 	• AB 680 permitted Caltrans to enter into P3 agreements for 4 demonstration projects. • Up to 35-year lease authorized. • Allowed the developers to charge tolls. • Legislative approvals not required	• Record of transactions indicates 1 project i.e., SR 91 (which was one of the four projects) • TIFIA available but PABs not authorized	• AB 680 was limited; authorized four "demonstration" projects and it did not allow state or federal funds to be used to supplement private (I,P)
Identification of Need 	• The project was part of state or regional plans, but sufficient funds to develop it had not been identified (S,C)	None	• The project was not published in a "pipeline", but this was not common practice in the US in this period. (S)
P3 Determination 	• Signals public sector commitment to reduces risk of termination or delay (S,I,P) • Concessionaire basically had control over the schematic and detailed design.(I,S)	• Once the project is awarded ROW acquisition and environmental permit must be completed by the franchise (I,P)	• Caltrans due diligence process did not explicitly assess the suitability of a P3 via BCA or VfM analysis (S)
Stakeholder Management 	• Citizen, citizen group, and agency (local and Govt.) agency were heavily involved (opposition) with the project progress.(CI,P)	None	• As per AB legislation ROW acquisition and NEPA approval was completed by investors S,C) • Citizen and different groups (i.e. local govt.) opposition led litigation and took 7 years for NEPA approval.
Public Sector Capacity 	None	None	• Relatively inexperienced in handling P3 (I/P)

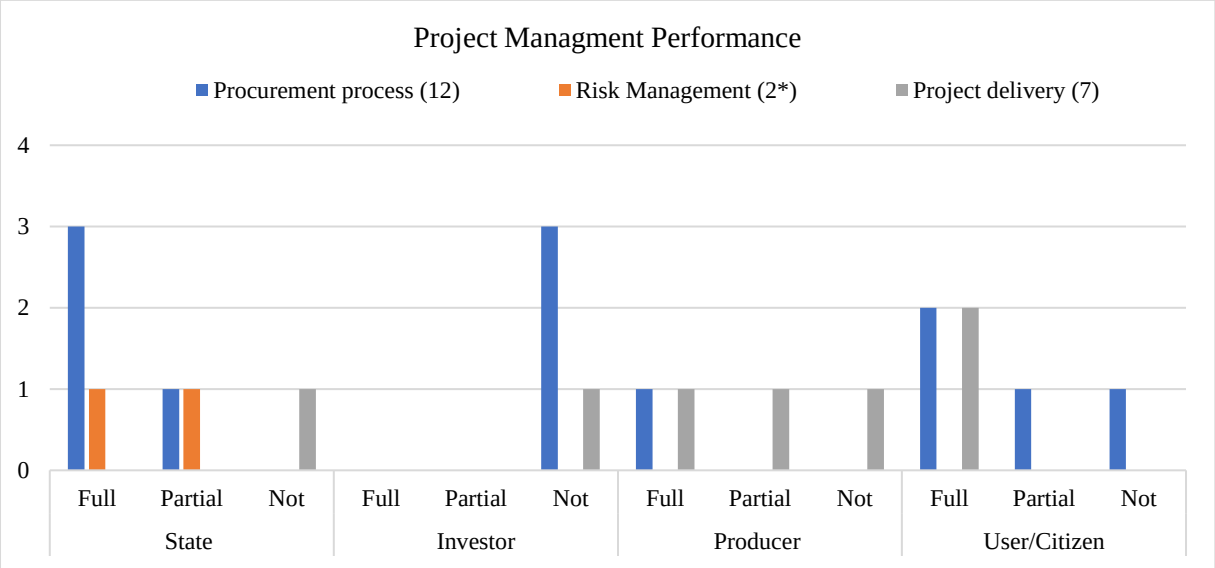
Discussion

Figure 4.14 depicts the performance dimensions associated with the project planning level of performance; key aspects of each performance dimension are further highlighted Table 4-11. AB 680 was enacted to encourage private investment in transportation infrastructure through the proposal of privately identified transportation projects. AB 680 granted limited authority allowing four demonstration projects in California and SR 125 is one of them. SR 125 would complete a missing link in the San Diego freeway network and create access to the US- Mexico border crossing. It was anticipated that the NAFTA agreement (1994) would create more cross-border truck traffic in that region. Subsequently, the need to develop SR 125 became prevalent. However, no funding was secured to construct it. Hence, the non-availability of project funding had delayed the project for almost forty years until the AB 680 legislation facilitated SR 125's development (PPIAF 2009). However, funding was provided to build the north ending part of SR 125 (San Miguel connector) through "TransNet" (TransNet is a half-cent sales tax for local transportation projects). The conditions of the legislation and the terms established by Caltrans provided that the selected franchisees had two major responsibilities: (1) the franchisee had the full responsibility for the project's development, and (2) the franchise was required to complete ROW acquisition and environmental permitting. Hence, the franchisee was granted the right to privately plan and develop this roadway subject to the basic conditions of the franchise. While the AB legislation was limited, it allowed responding consortia to identify and propose potential demonstration projects, which provided the impetus to develop the long-planned SR 125 project.

4.7.3 Project Management Performance

In 1989, Caltrans issued a Request for Qualification (RFQ) for the four demonstration projects, and 10 potential developers were shortlisted (Miller 2000). Subsequently, an RFP was issued; eight developers responded. Ultimately, four development groups were selected following the evaluation criteria established by Caltrans. The other three projects that were selected under AB 680 were SR 91, SR 57 and the Mid-State Tollway (Eno Center for Transportation 2014). California Transportation Ventures (CTV) proposed SR 125, and it was a consortium of four firms, each of which had equal ownership in the company. Caltrans and CTV negotiated the terms of their partnership during the latter half of 1990 and signed a franchise agreement for SR 125 in January 1991. The agreement allowed CTV to finance and build the road, lease operative rights for a concession period of 35 years upon completion of

construction and then transfer the title of the road to Caltrans after the franchise period. The concessionaire would set the toll rates subject to a rate of return rate cap of 18.5 %. The agreement also prohibited the building of competitive roads by Caltrans that could divert traffic.



* No overlaps are counted between two stakeholders.

Figure 4.15 Project management performance

As per the franchise agreement, CTV had to receive final environmental approvals before the final agreement could be executed. In December 1997, CTV submitted for environmental clearance. As one interviewee indicated: “While there was a need and a purpose for the facility, there were a lot of environmental hurdles that the roadway had to navigate, most notably in the northern section of the road. There were some endangered species that required significant investments in mitigation. The way that the alignment had to be laid out, it ultimately lengthened the facility, and so that SR 125 required more CapEx and right of way acquisition”. The project finally received environmental approval in 2003 after lengthy delays due to public opposition, unforeseen complications, and other factors; it took 12 years from franchise award to reach the final agreement (1991-2003). The capital requirements for the project had risen to $667 million at financial close in 2003, more than 50% over the original project cost estimated at roughly $400 million in 1990. After such a long transaction period, CTV decided to minimize their SR 125 franchise investment, and ultimately decided to sell to new investors. In September 2003, Macquarie Infrastructure Group (MIG) purchased an 81.6% stake in CTV. Later, MIG acquired the remaining shares and formed South Bay Expressway Limited Partnership (SBXLP) as the new concession

company to implement the project. Construction started in May 2003 and ended in November 2007 about one year behind schedule. Tolling operations began about two months later.

Table 4-12 Project management performance assessment

Summary of Stakeholder Interests Assessment			
Performance Dimension	Fully Met	Partially Met	Not Met
Procurement Process 	• 10 firms shortlisted following RFQ and 8 responded to RFP. • Holder of franchise was transferred responsibility for defining scope of project • The scoring process for the proposals received was published in the RFP (I,P,C)	• Caltrans process was incremental since it was a pilot program. • Eight companies submitted responses in 1990 to develop UNIQUE projects in response to RFP .	• Process proceeded incrementally, so respondents had little knowledge of how this process would proceed (S,I) • Environmental approval process took over seven years to complete. • CTV was responsible for securing the environmental permits for the project, with the contract language stating that Caltrans will act as merely a support in the process (S,I)
Risk Management 	• Risk arrangement followed DBFOM P3 practice (S,I,P)	• All CTV, MIG and lenders took considerable risks including construction and delivery, while bringing an important asset into the Caltrans 's portfolio.(S,I)	None
Project delivery . 	• No evidence of major accident during construction	None	• The private developer raised capital to construct a $ 344 million project which later estimated to $668 million, thanks to prolonged environmental approval process.(I,P,S) • Construction began in May 2003 and completed in November 2007 (one year delay) (I,P)

Discussion

Figure 4.15 depicts the performance dimensions associated with the project management level of performance; key aspects of each performance dimension are further discussed in Table 4-12. In selecting the franchisee, Caltrans proceeded incrementally issuing an RFQ to gauge private sector interest and qualifications (i.e., publicly led procurement), and this was followed by an RFP to 10 pre-qualified consortia. However, Caltrans had to publish rather generic scoring criteria since it could not predict what projects the short-listed teams would propose. Effectively, Caltrans had to evaluate unique proposals. CTV proposed SR 125, and it was selected for implementation. The environmental clearance process was the biggest challenge to the SR 125 project. CTV had assumed, under the terms of the franchise agreement, all the risks associated with obtaining the necessary environmental permits. It took 7 years (1997-2003) to get the final environmental clearance. As franchise owner, CTV did not anticipate the subsequent long and costly environmental process, which undermined its attractiveness and profitability. If these risk factors were better understood before the franchise was awarded, CTV would likely chosen not to pursue the franchise; this led to its sale to MIG. Overall, CTV, MIG and lenders took considerable risks including project permits, construction, and delivery, while bringing an important asset into the Caltrans's portfolio. Project delivery itself also encountered problems; SR 125 was delayed 13 months and opened November 2007, just prior to the recession (Samuel Staley 2010). Final costs were $658 million. Hence, the project management outcomes for all stakeholders were compromised by the severe delays and cost escalation that SR 125 experienced; once the franchise was awarded, it took more than a decade to open for service.

4.7.4 Business Performance

The business performance of SR 125 had several noteworthy shortcomings for stakeholders. As mentioned earlier, SR 125 opened shortly before the 2008 recession, and toll revenue fell well short of the original projections. The toll road had approximately half of the traffic volume estimated by the investors in 2003, apparently due to the economic fallout from the housing and credit markets (Samuel Staley 2010). In December 2009, SBXLP, the equity partners, and senior lenders signed a standstill agreement, halting debt payments until restructuring negotiations were complete. This step was seen as the first alternative to bankruptcy. In March 2010, however, SBXLP filed for bankruptcy.

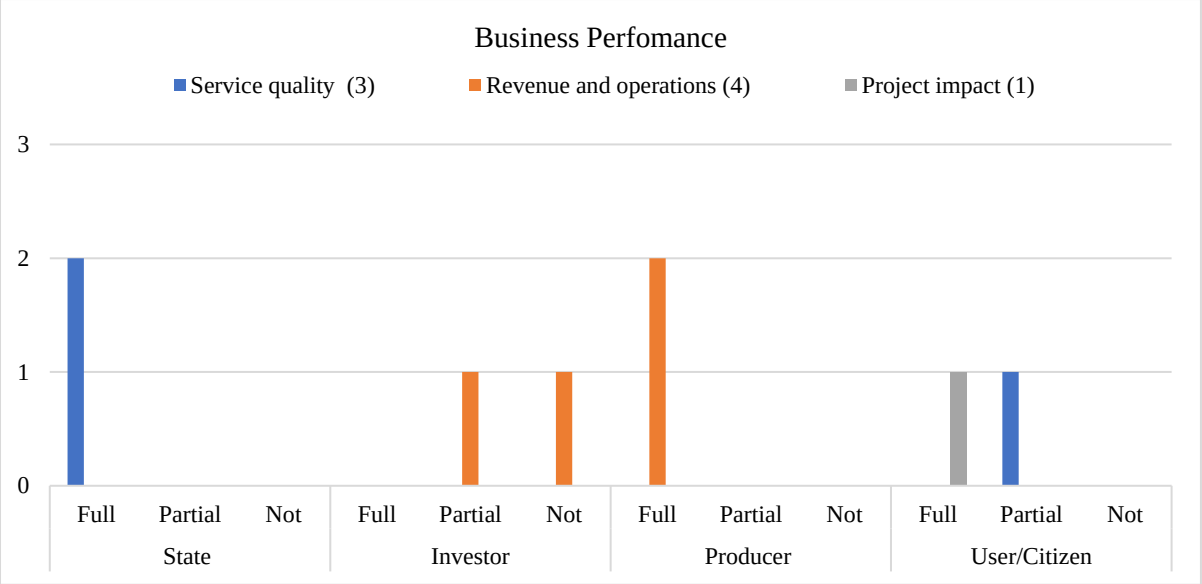


Figure 4.16 Dimension of business performance

The primary reason for the bankruptcy filing, according to the bankruptcy proceedings, was the on-going claims made by the contractor who built SR 125 (Garvin 2019). In April 2011, the project emerged from bankruptcy under a new concession company, SBX LLC, which was owned by the project's secured lenders including the TIFIA program. The consequences for unsecured lenders (Otay River Constructors) and equity investors were significant; they fully lost their investment. In December 2011, SANDAG purchased the SR 125 franchise to operate the toll road for $344.5 million, after roughly five months of negotiations with SBX LLC (U.S. Department of Transportation 2014); the purchase was made with the support of "TransNet" sales tax and TIFIA debt, at roughly half of what the private consortium spent to build it. The "second life" of SR 125 had begun. Once SANDAG took over, it reevaluated the current condition and laid out plans for future steps. SANDAG conducted a due diligence process and public review and subsequently reduced the toll rate as much as 40 percent on June 30, 2012. Currently, SANDAG still owns the franchise, and it will revert SR 125 to Caltrans in 2042.

Table 4-13 Business performance assessment

Summary of Stakeholder Assessment			
Performance Dimension	Fully Met	Partially Met	Not Met
Service quality . 	• SR 125 became an integral part of San Diego traffic network (S,U) • Caltrans has less oversight on SANDAG since they took over the project. (P, SANDAG)	None	None
Revenue and operations 	• No financial burden to citizens on the event of financial distress/bankruptcy (S,U)	• After the reduction of toll the usage of SR 125 has increased.(I,P)	• SR 125 faced bankruptcy and investor, producer and lender lost part or all of their investment. (I,P)
Project impact 	• Increase commercial activities. • New port of entry at the US- Mexico border.	None	None

Discussion:

Figure 4.16 depicts the performance dimensions associated with the business performance level; key aspects of each performance dimension are further highlighted in Table 4-13. Once built, SR 125 became an integral part of the San Diego traffic network (Build America Bureau 2012) but the traffic and revenue performance were worse than anticipated. The project was opened in a period of recession and the toll revenue forecast of SR 125 failed to materialize. Subsequently, the project started facing severe financial distress and SBX LP filed for bankruptcy. The outcome of these events created an opportunity for SANDAG. Once the project emerged from bankruptcy, SANDAG bought the project at roughly half of the original project cost. As a public agency, SANDAG elected to lower the toll rates to attract more through traffic and relieve congestion on I-805. One interviewee stated: "Our strategy makes us somewhat unique because most tolling operators have developed toll increase plans that gradually rise over time." Further, in September 2017, SANDAG offloaded fixed-rate series 2017 revenue bonds, which generated $194 million. This refinancing strategy helped SANDAG's outstanding loans and secured a more conservative debt service structure that will save more than $147 million over the 26-year life of the loans. Overall, the business performance is one of financial loss for the original investors but one of strategic investment by SANDAG; its acquisition of the roadway shifted its purpose to align with a public agency's goals rather than private investment goals.

4.7.5 Future Potential

According to SANDAG, SR 125 is performing above expectations and Fitch has affirmed SANDAG's South Bay Expressway Series 2017 Bonds at 'A' with Outlook Stable (FitchRatings 2021). SANDAG has found the road is profitable and demonstrates the agency's successful investment as a consequence of reducing tolls and extensive public outreach. An interviewee discussed SANDAG's alternative approach: "… because of the favorable interest rates that we were able to secure, then we issued our bonds. Our financial projections showed that we do not need to increase tolls." An interviewee added: "we conducted a study to examine the amount of traffic that shifted from and after the toll reduction strategy that was put into place after SANDAG's ownership". As the project integrates to overall San Diego transportation system, usage by commercial trucks has increased, and this has relieved congestion on I-805, I-905, and SR 54. More importantly, one interviewee explained: "SANDAG is also working with Caltrans to construct a third port of entry at the US Mexico border and the location of that future port of entry is a few miles from

SR 125 toll road…we are hopeful". This situation is expected to enhance the future value of SR 125.

4.7.6 Conclusion

Figure 4.17 illustrates those 25 interests were fully met and 13 indicators were partially met, while the remaining 18 were not met. In an experimental initiative by California, CTV came forward to develop the project using private equity and subsequently lengthy environmental litigation led to a permitting process that took 7 years. The process was too long and too expensive; consequently, CTV sold its stake. MIG took over the franchise and started the roadway's construction. Again, the project was delayed. The project opened at the outset of the recession and later filed for bankruptcy. Hence, the private players took on considerable risks and lost while bringing an important asset into the Caltrans portfolio. Subsequently, SANDAG grabbed the opportunity and paid roughly half of the original construction costs to buy the franchise. Overall, California's pilot program led to delays, traffic shortfalls and financial loss for the private participants; however, the distressed asset has been repurposed under SANDAG's ownership and its future seems promising.

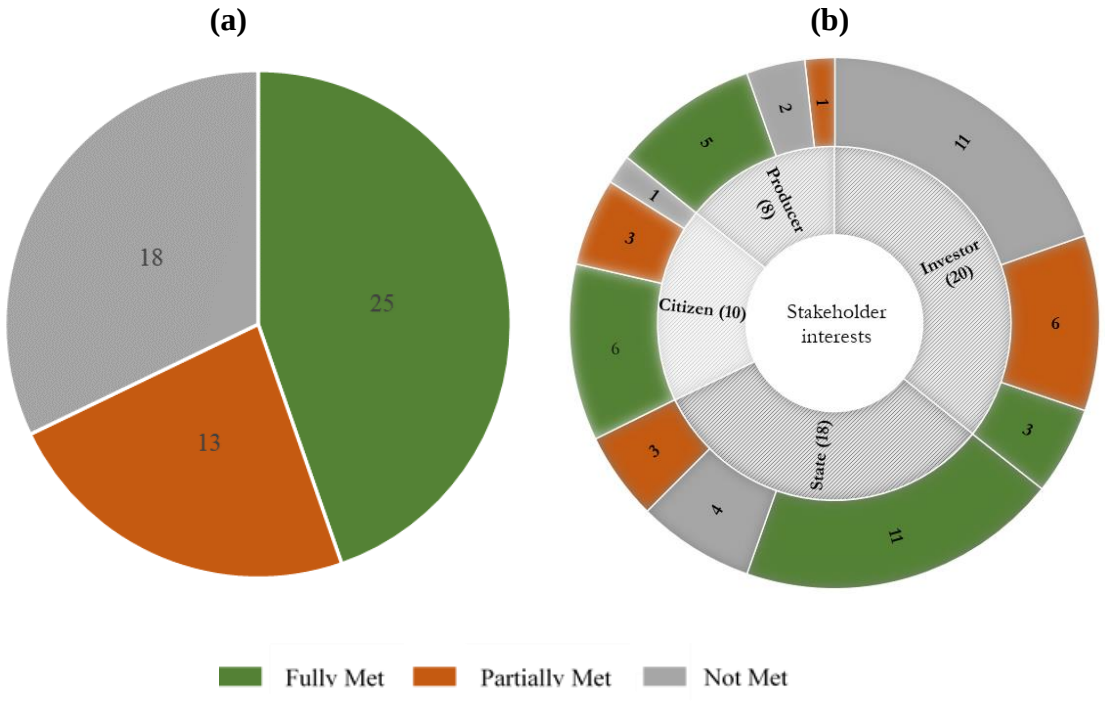


Figure 4.17 Assessment of stakeholder interests: (a) cumulative and (b) by stakeholder

4.8 SH 130 (5&6), TxDOT, Texas

4.8.1 Project Overview

The 41-mile southern section of SH130 (5&6) is a publicly owned toll road that is privately operated and maintained for a 50-year concession period with TxDOT pursuant to Texas CDA legislation HB 3588 (2003) and HB 2702 (2005). The project was opened in 2012, and project cost was $1.35 billion. The timeline of key events for the case is depicted in Figure 4.18. In addition, the P3 Stakeholders Interests Register for the project is shown in Section 8.4, which illustrates the extent that stakeholders interests were met based on their associated indicators for the project setting and phases.

4.8.2 Project Planning Performance

In 2003, the Texas State Legislature authorized HB 3588 bill to conduct transportation P3s using Comprehensive Development Agreements (CDA). As noted in the LBJ Express case, the legislation granted broad authority for TxDOT to utilize CDAs by (1) accessing private sector financing, (2) facilitating the Trans-Texas Corridor (TTC- 35) plan, and (3) authorizing both solicited and unsolicited PPP proposals. Subsequently, on May 29, 2005, Texas State Legislature passed HB 2702, which clarified certain provisions of HB 3588. The law authorized TxDOT to enter into a number of Comprehensive Development Agreements (CDAs) from DB (Design-Build) procurement to DBFOM (Design-Build-Finance-Operate-Maintain). This legislative and regulatory environment propelled investors and producers with incentives to engage in P3s in Texas.

In the 1990s, TxDOT explored new financing and investment opportunities to manage the increased traffic and congestion across strategic interstate highway corridors. TxDOT officials began to consider tolling as a way of financing transportation infrastructure or utilizing motor vehicle revenue through fuel tax increases. Neither of these options were found sustainable (USDOT 2016). In early 2002, Governor Rick Perry unveiled the “Trans-Texas-Corridor” program (TTC), a network of transportation corridors across the state. One of the priority segments paralleled I-35 from Oklahoma to San Antonio, which was expected to divert much of the freight transportation across this region from congested I-35; this segment became known as TTC-35. TxDOT envisioned that TTC-35 would serve as an Eastern Bypass would include SH 130. In December 2004, after a competitive procurement, the Texas Transportation Commission selected Cintra-Zachry to develop a preliminary

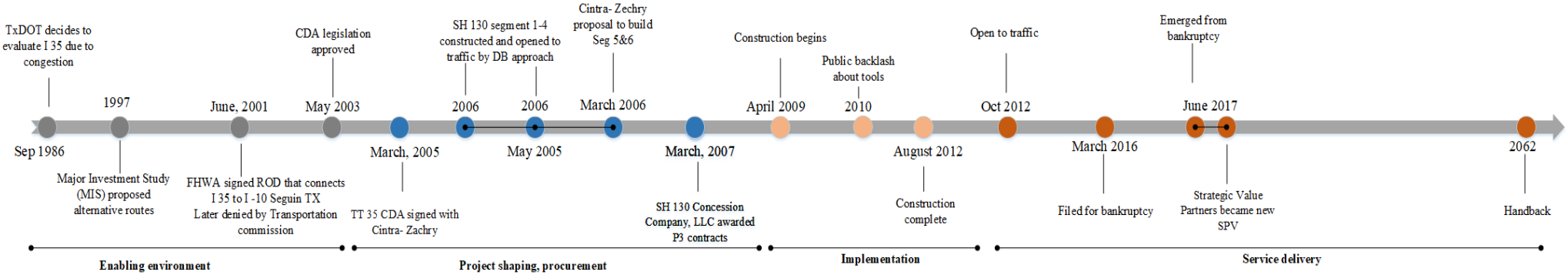
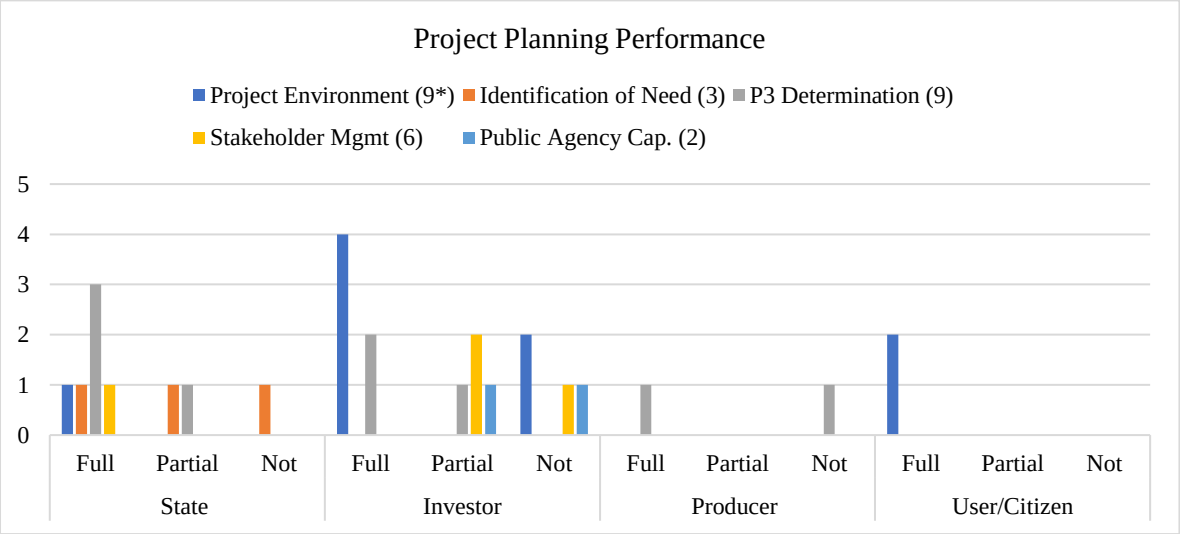


Figure 4.18 Timeline and milestones of SH 130 (5&6)

concept and financing plan for TTC-35, and a Comprehensive Development Agreement (CDA) was signed in March 2005 under HB 3588 legislation (AECOM 2007). Cintra-Zachry proposed to fund TTC-35 from the proceeds from tolls collected through the corridor and their plan included capital investment of up to $6 billion plus a front-end concession fee of $1.2 billion to develop and operate TTC-35 (Trasportation Research Board 2009). The Cintra-Zachry-TxDOT CDA neither specified how to set and adjust the toll rates for the corridor nor how to term all of the toll concessions. TxDOT started planning the first 49 miles connecting SH 195 north of Georgetown, TX with US 183 at Mustang Ridge, TX. The estimated cost for the planned improvements to SH 130 that included six segments was $3.25 billion. Of which, $1.282 billion was allocated for the first four segments, i.e., SH 130 (1-4), which was to be built using design-build arrangements and financed using revenue bonds. Consequently, TxDOT proceeded with this project, and SH 130 (1-4) was opened to traffic between 2006 and 2008 under TxDOT operations. In its planning of the improvements to SH 130, TxDOT performed various feasibility studies. It is worth noting that the massive TTC-35 has never been developed – in 2010 TxDOT and FHWA decided "no action", after facing strong environmental and toll issues (Peterka 2011; Sallee 2008).



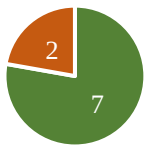
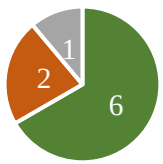
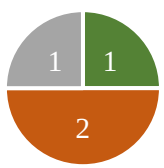
* No overlaps are counted between two stakeholders.

Figure 4.19 Dimension of project planning performance

Though TxDOT developed SH 130 (1-4), they identified three major reasons not to develop the last two segments (5&6): (1) studies predicted that segments 5 and 6 would be financially unsustainable, (2) lack of financial resources, and (3) lack of public support for toll road construction. Subsequently, TxDOT was reluctant to develop SH 130(5&6). Further, the agency was not considering it for a P3 either. However, the TTC-35 CDA enabled Cintra-

Zachry to develop projects within the corridor and allowed it to negotiate further CDAs to develop them. Consequently, Cintra-Zachry submitted an unsolicited proposal to develop SH 130 (5&6).

Table 4-14 Project planning performance assessment

Summary of Stakeholder Interests			
Performance Dimension	Fully Met	Partially Met	Not Met
Project Environment 	• State legislation HB 3588 (2003) and subsequent HB 2702 (2005) supported TxDOT to pursue TTC 35.(S,C.I,P) • Authorized TxDOT to enter into a range of CDAs from DB, DBFOM with a limited concession of 50 years (S,I,P).	• Opposition to TTC 35 mounted, so TxDOT refined HB 3588 by HB 2702.	None
Identification of Need 	• Due to growing traffic volumes and congestion on I 35, and strategic initiatives TxDOT identified the need to develop SH 130 1-6 as a part of TTC- 35 (S)	None	None
P3 Determination 	• TxDOT performed due diligence activities and acquired NEPA approval. • TxDOT department's prior studies predicted that segments 5 and 6 would be financially unsustainable. (S,C) • Unsolicited proposal for SH 130 (5&6) by Cintra-Zachry	• No explicit P3 determination process was followed exclusively for SH 130	• TxDOT did not perform any VfM study for SH 130 (5&6)
Stakeholder Management 	None	• TxDOT and Cintra jointly performed stakeholder engagement during preconstruction (Site acquisition) of SH 130 (5&6)	None
Public Sector Capacity 	None	None	• SH 130 (5&6) is the first P3 project initiated by TxDOT and relatively inexperienced in P3 transportation development

Discussion

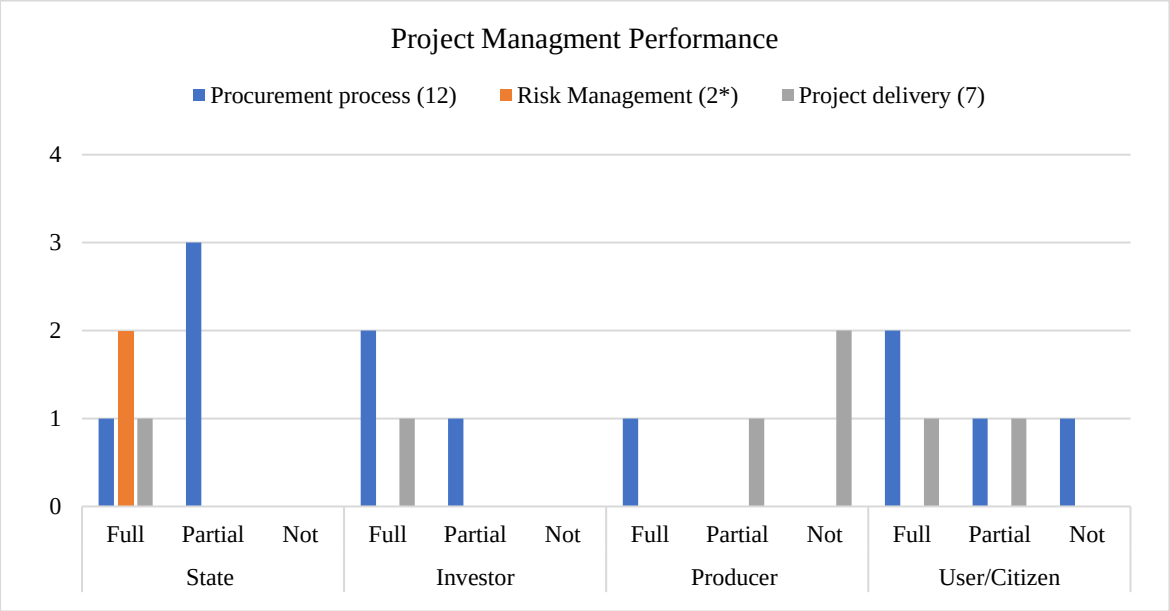
Figure 4.19 depicts the performance dimensions associated with the project planning level of performance; key aspects of each performance dimension are further highlighted in Table 4-14. TxDOT commenced to develop the Trans-Texas Corridor (TTC-35), which would include toll roads, rail line, and utility facilities across the state. Once TTC-35 was authorized by HB 3588 in 2003, TxDOT signed a CDA with Cintra-Zachry in 2005 to plan TTC-35. Further, the CDA allowed Cintra-Zachry to identify future developments within TTC-35 and allowed the right of first negotiation for development of selected near-term facilities subject to TxDOT's approval. TxDOT took initiatives to develop TTC-35 and planned to improve SH 130, which was later divided into six segments (1-6). SH 130 (1-4) was developed as a toll road and construction was completed by the end of 2006, but TxDOT determined that the remaining segments (5-6) were not feasible. One interviewee explained that the agency's investigations "showed that the project would not be viable. This would raise questions about the public agency's ability to assess traffic and revenue". The interviewee further added: "The traffic and revenue studies are very sensitive and depend on the user's willingness to pay. Small differences in the assumptions – for example split of different classifications of vehicles – make changes. Very sensitive to the business rules around tolling, the violation policies, prohibitions of running certain vehicles in toll lanes, etc. All these things make it very difficult for the public sector to really value a project". While TxDOT was unwilling to proceed with Segments 5&6, Cintra-Zachry stepped forward with an unsolicited proposal under the terms of its TTC-35 CDA.

4.8.3 Project Management Performance

Cintra-Zachry presented its unsolicited proposal to develop segments 5-6 in March 2006, in accordance with the terms of the TTC-35 CDA. After receiving the proposal, TxDOT did not issue requests for competing proposals. As a result, in March 2007, TxDOT signed a CDA with SH 130 Concession Company, LLC, (led by Cintra-Zachry) for a 50-year concession period. Subsequently, the project reached financial close in March 2008.

The total project cost was $1.327 billion, financed with 15.8% private equity, 51.6% senior bank loans, 0.2% interest income, and 32.4% TIFIA loans. The contract had two noteworthy conditions: (1) once the project was open TxDOT would receive $25 million as a concession fee and (2) TxDOT could approve an increase in the speed limit to 85 mph in exchange for $100 million paid by the concessionaire.

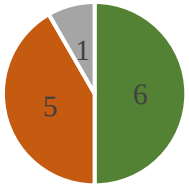
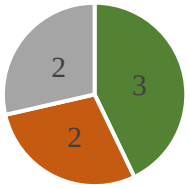
Construction started in April 2009 and was completed in August 2012 within the project's cost and time limit. In October 2012, the facility opened, and the SH 130 Concession Company paid the full concession fee of $125 million to acquire the right to raise the speed limit to 85 mph. This was tied to a corresponding maximum speed reduction on the US 183, a parallel route, from 65 MPH to 55 MPH. Within the first year of opening the project, TxDOT notified Cintra- Zachry about construction quality issues, specifically about the pavement quality. One interviewee commented: "Some of the maintenance issues because of the unique soil at SH 130. Maybe they underestimated it".



* No overlaps are counted between two stakeholders.

Figure 4.20 Dimension of project management performance

Table 4-15 Project management performance assessment

Summary of Stakeholder Interests			
Performance Dimension	Fully Met	Partially Met	Not Met
Procurement Process 	• TxDOT engaged a team led by Cintra- Zachry to prepare a master development plan for the entire TTC-35 corridor after following a competitive process in March 2015.(S,P,I) • Cintra-Zachry negotiated scope with TxDOT (S,P,I)	• Not exclusively for SH 130 (5&6) but Cintra was selected for TTC -35 in competitive process.	None
Risk Management 	• No state or public funding • The agreement also included a revenue-sharing mechanism based on project's base case projections	None	None
Project Delivery 	• The SH 130 were completed ahead of schedule and under budget by approximately $438 million, primarily due to lower-than-expected construction bids and good weather	None	• TxDOT notified the pavement flaws within the first year opening the project to use.

Discussion

Figure 4.20 depicts the performance dimensions associated with the project management level of performance; key aspects of each performance dimension are further highlighted in Table 4-15. The TTC-35 CDA gave Cintra–Zachry a "right of first negotiation" to be the developer of certain facilities that it identified, and this opportunity enabled Cintra-Zachry to pursue SH 130 (5&6). When Cintra- Zachry submitted its unsolicited proposal, this surprised many TxDOT officials, as previous studies by the agency predicted that segments 5 and 6 would not be financially sustainable. More importantly, TxDOT did not request competing proposals, which they could do under the CDA legislation. Further, the offer from Cintra-Zachry to TxDOT was lucrative, with the prospect of receiving up to $125 million in concession fees at project completion without taking on any financial liabilities itself. Most likely, Cintra-Zachry saw this project as a strategic opportunity – to get a CDA project in Texas underway. One interviewee commented: "For Cintra, at least, this was just the first of what was then expected to be a whole series of concessions in Texas off the back of the Trans Texas Corridor-35".

4.8.4 Business Performance

Once the project opened, Cintra-Zachry raised the speed limit to 85 MPH (the highest in the USA), as authorized by TxDOT; however, reports suggest that the higher speed limit has attributed to an increase in accidents (George 2012). Studies showed that drivers traveling in 85-mph zones travel about 98 mph (State highway 130 2019). In addition, major quality issues emerged in the pavement, and TxDOT issued notices to the concessionaire multiple times (Phillips 2016; Buchanan 2016). By 2014, an independent company HDR ultimately found 160 major pavement defects, and TxDOT imposed a $428,905 penalty on the concessionaire along with repair requirements. Further, SH 130 (5&6) faced severe traffic and revenue shortfalls when it opened to traffic. By April 2013, about half the projected traffic on the roadway had materialized. Consequently, Moody's downgraded the company's debt to "junk" status due to low traffic revenues, raising the possibility that TxDOT might terminate its toll contract with the group (Peterka 2011). By June 2014, traffic was approximately 60% below projections; throughout 2014 to 2015, traffic fluctuated but never met its forecasted levels.

To boost the traffic, TxDOT paid for almost 400 signages in the I-35 corridor promoting use of SH 130. In addition, TxDOT subsidized discounted toll rates for the trucks

to incentivize using SH 130 instead of the I-35 corridor (Texas A&M Transportaion Institute 2015). In March 2016, SH 130 Concession Company filed for Chapter 11 bankruptcy protection. Cintra relinquished the ownership of the facility to its creditors on September 9, 2016, but the facility remained in operation. One interviewee commented: “Forecasts were aggressive and then they had some maintenance problems that they had to put some more money in it. And they were not able to perform, and it was a classic P3 where the risk transfer occurred. They could not pay their bills and they filed for bankruptcy and all during the time the road operated as it should”. In May 2017, SH 130 Concession Company emerged from bankruptcy with the lenders taking ownership. Some lenders sold their stakes to Strategic Value Investors, which became and remains the majority shareholder and owner of the SPV. One interviewee commented: “We were involved in the transition because we had to OK the new operator. Again, now the road is functioning fine. Obviously, people are using SH 130 now and we have no issues currently with the management of the project”.

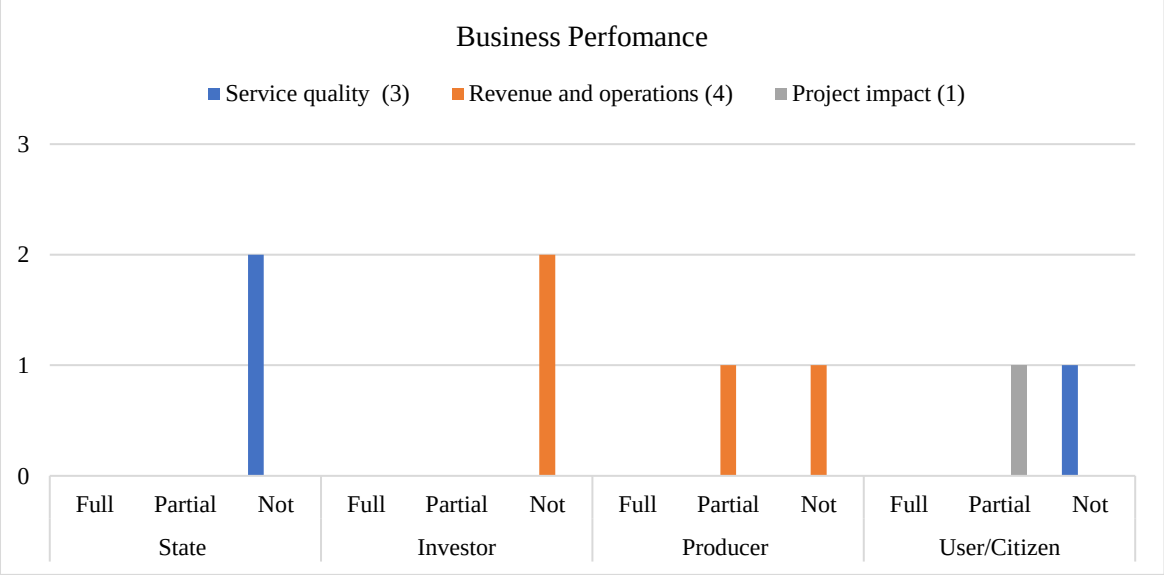


Figure 4.21 Dimension of business performance dimension

Table 4-16 Business performance assessment

Summary of Stakeholder Interests			
Performance Dimension (Interests Assessment)	Fully Met	Partially Met	Not Met
Service quality 	None	None	• 70 mph to 85 mph (raised by concessionaires) poses safety concern. • Inferior service quality (pavement related)
Revenue and operations 	None	• SH 130 (5&6) emerged from bankruptcy May 2014	• The growth in traffic and revenue was not sufficient to meet debt obligations. • Due to severe financial distress continued to grow when TIFIA's interest payments began in 2017.Subsequencntly declaration of bankruptcy. • Despite TxDOT's incentives the traffic did not meet expectations.
Project impact 	None	• Increase of tourism and recreation areas development in Lockhart areas. • New planning under developing.	None

Discussion

Figure 4.21 depicts the performance dimensions associated with the business performance level. Key aspects of each performance dimension are further highlighted in Table 4.16. The highway has experienced safety issues especially for 16 axle trucks as a consequence of the 85-mph speed limit (Barr 2018). Further, despite congested conditions on I-35, drivers had to pay an additional $27.84 when using the tolled SH-130 facility when traveling through Austin (Seedah et al. 2013), and drivers also had to pay an additional $8.64 when using SH-130 because of the extra 11.6 miles they must drive.

Hence, pavement issues that appeared during the first year of operations resulted in inferior service quality, and safety concerns due to the increased speed limit of 85 mph caused dissatisfaction and risk for TxDOT and users. In its fourth year of operations, SH 130 (5&6) filed for bankruptcy since expected traffic never materialized. Consequently, this strategic move by Cintra-Zachry did not work out in this instance. Overall, the project had specific technical, safety and financial issues that did not meet state, investor or user interests.

4.8.5 Future Potential

SH 130 (5-6) is under new ownership, and the reorganized SH 130 Concession Company has essentially assumed all the project's risks including the repair of pavement defects. The Company has invested over $90 million to improve the pavement condition (SH 130 Concession Company, LLC 2019). Further, the Company has reduced the toll rate up to 40% to attract more users. At this stage, the outlook for SH 130 (5-6) remains unclear. Finally, the moratorium on the use of P3-enabling CDAs in Texas remains in effect. In 2017, the Texas House of Representatives voted down a bill to authorize CDAs for specific highway projects. Consequently, the debate about the future P3s in Texas continues.

4.8.6 Conclusion

Figure 4.21 illustrates the outcomes of the assessment of stakeholder interests where 26 interests were fully met, 15 were partially met, and the remaining 15 were not met. TxDOT wished primarily to reduce congestion, improve regional mobility, and improve facility access when developing the 90.1-mile SH 130 highway. While SH 130 (5-6) demonstrated the project acceleration, cost and schedule certainty, and risk transfer benefits offered by P3 procurement approaches, the project ultimately confronted a range of issues, and its financial troubles pushed it into bankruptcy. The unsolicited proposal submitted by the Cintra-Zachry team did not pan out as intended. As one interviewee commented: "We would

always, if we were to be given the tool again, it would be through competitive procurement". The demand shortfalls of SH 130 were not limited to segments 5 and 6; segments 1 through 4, where tolling is controlled by TxDOT, have also had limited success attracting traffic. Nonetheless, Texas received a substantial expansion of SH 130 through this CDA as well as a concession payment of $125 million. From this perspective, the state benefitted from the risk transfer that occurred.

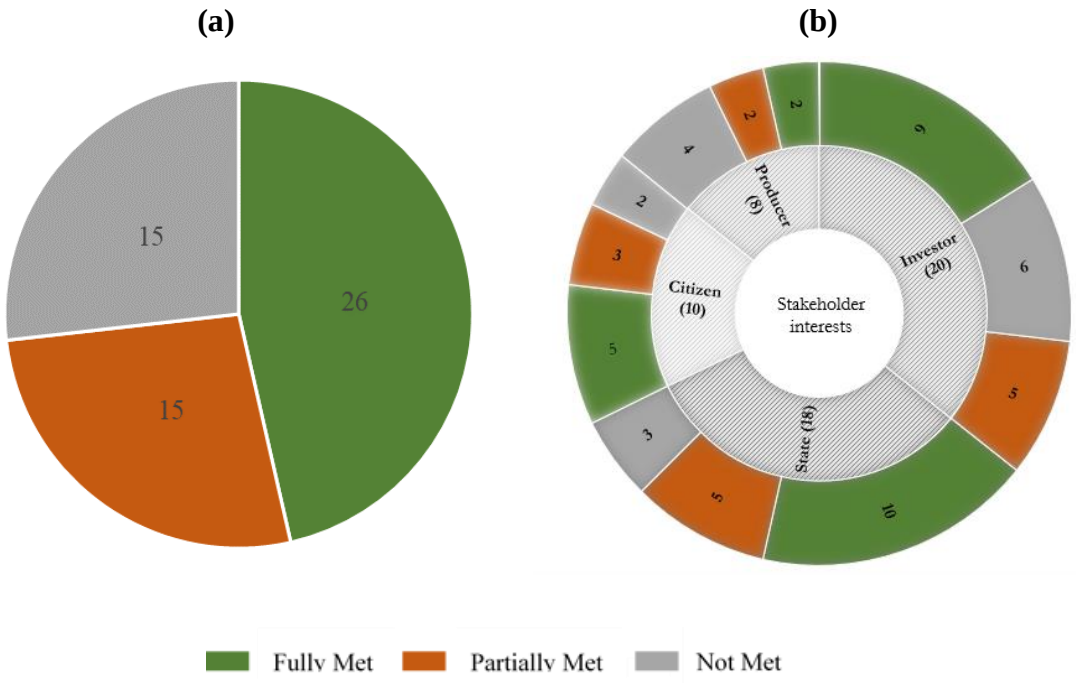


Figure 4.22 Assessment of stakeholder interests: (a) cumulative and (b) by stakeholder.

4.9 Across Case Comparison

The comparative appraisal of the four cases is based on the individual case assessments presented in the previous section. The appraisal focuses on: (1) the 11 performance dimensions and their corresponding interests and indicators and (2) the four levels of performance, which are based on their associated performance dimensions.

4.9.1 Project Planning Performance

A.1 Project Environment

The legislation enacted in each state (Virginia, Texas, and California) in the four cases was central to what transpired. Virginia's PPTA legislation (1995) and Texas' HB3588 (2003) provided broad authorization for P3 initiatives. The legislation and their executive frameworks were sufficiently flexible to attract private investors, and both permitted solicited and unsolicited proposals. Some key differences also existed; PPTA projects could combine

public and private funds while CDA projects were discouraged from doing so; no limits existed on PPTA concession periods while CDA periods were restricted to 52 years. Alternatively, AB 680 in California was limited; it authorized approval of up to four geographically dispersed demonstration projects that would be financed solely by the private sector with no state funding permitted. The law allowed a private entity to operate the facility up to 35 years and then transfer it back to the state. The investment environments in the three jurisdictions were comparable although PABs were not available for SR 125. In addition, all three jurisdictions had either developing or no experience with P3s.

A.2 Identification of Need

This dimension considers whether there was a clear need for each of the four projects based on three indicators. I-495, LBJ Expressway and SH-130 were part of state transportation plans while SR-125 was included in SANDAG's regional plan. Further, the state of current conditions for I-495 and LBJ Expressway were also comparable; both were expansions of congested routes within an urban network. Whereas SH 130 (5&6) and SR 125 were arterial roadways intended as alternatives to relieve congestion on nearby routes. Hence, the projects had similar purposes, but different drivers of traffic demand, as will be discussed subsequently. The state's need for each project was evident, but arguably the need for SH-130 and SR-125 was less urgent.

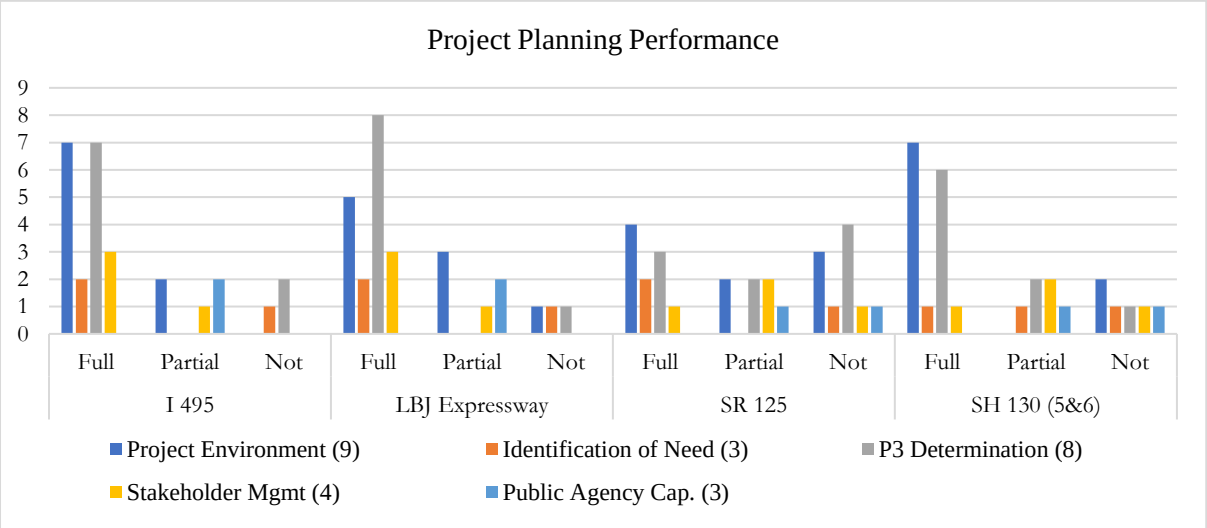


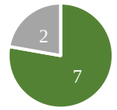
Figure 4.23 Project planning performance assessment of the four projects.

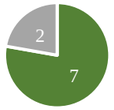
A.3 P3 Determination

The P3 determination considers 5 key interests using 9 performance indicators. All four cases had similar characteristics in this dimension. For I-495, VDOT's planning resulted in 4-4-4-4 configuration with HOV lanes and estimated cost of $2.5 to $3 billion, which met

with opposition. Fluor submitted its unsolicited proposal for the 4-2-2-4 configuration with HOT lanes. This proposal provided an alternative for VDOT while Fluor would have an opportunity to pursue an attractive opportunity. VDOT worked collaboratively with its private partners to negotiate the scope and terms of the project. Similarly, TxDOT was exploring conventional options to improve the LBJ IH-635 corridor, and its plan ultimately entailed tunneling to add six underground lanes. Like VDOT, they were following a conventional approach, but could only marshal $900 million of the estimated $2.5 billion needed. However, here is where the paths of these projects diverge; TxDOT opted to pursue a P3 through a competitive procurement process. SH 130 (5&6) evolved out of the 4,000-mile Trans-Texas Corridor 35 (TTC-35) plan initiated by TxDOT. TxDOT competitively selected the team of Cintra-Zachry to support master planning of TTC-35. When SH 130 was identified for development, TxDOT divided the route into six segments (1-6) and constructed segments 1-4 itself. The Cintra-Zachry team proposed to develop Segments 5&6 under a CDA; this was approved, and the team moved forward with planning of these two segments. In California, SR 125 was one of four demonstration projects awarded as a private franchise; it was selected by Caltrans after evaluating unique conceptual proposals. The franchisee was granted the right to privately plan and develop this roadway subject to basic conditions of the franchise.

Table 4-17 Cross Case appraisal of project planning performance

Performance dimension	I-495	LBJ Expressway	SR 125	SH 130 (5&6)
Project Environment • 3 Interests • 9 Indicators	• Virginia's PPTA Act supported the path to P3 opportunities while its Implementation Guidelines provided clarity about its approval and evaluation process. • Project-specific legislative approvals were not required. • VDOT experience with P3s was developing. • Broad legislation. 	• Texas HB 3588 and subsequent refinement by HB 2702 allowed TxDOT to develop P3 projects under CDAs. • Project-specific legislative approvals were not required. • TxDOT experience was developing. • Broad legislation. 	• AB 680 authorized Caltrans to enter into franchise agreements (P3s) for up to 4 transportation projects in the state (at least one in north and one in south). • Authorized up to a 35-year lease, developers to charge tolls and no further legislative approvals required. • Caltrans had no prior P3 experience. • Limited legislation. 	• Texas HB 3588 and subsequent refinement by HB 2702 allowed TxDOT to develop P3 projects under CDAs. • Project-specific legislative approvals were not required. • TxDOT had no prior experience when Cintra-Zachry proposed project as CDA. • Broad legislation. 
Identification of Need • 1 Interest • 3 Indicators	• Need to alleviate existing congestion in urban highway. • VDOT was advancing a plan to deliver a 4-4-4-4 configuration that would add HOV/bus transit lanes in both directions using a conventional approach. • P3 was not under consideration. 	• Need to alleviate existing congestion in urban highway. • TxDOT was planning to expand to 18-20 lanes configuration by developing 2 HOV lanes, and 4 elevated managed lane along with GP lanes; subsequent decision to place new lanes underground. • P3 was not under consideration. 	• Arterial roadway to improve mobility and serve as alternative to nearby congested highways. • Initially included in the transportation plans of the California Transportation Commission, but later dropped. • Selected by private developer for proposal as one of private franchise projects under AB 680 P3s was considered as the first choice of option to develop. 	• Arterial roadway to improve mobility and serve as alternative to congested IH-35, which had seen significant increases in truck traffic. • Texas Transportation Commission's strategic initiative to develop TTC-35; TxDOT identified the need to develop SH 130 1-6 as a part of TTC 35. Subsequently developed SH 130 (1-4) itself. • Cintra-Zachry team proposed SH 130 (5&6) for development through CDA. 

P3 Determination • 5 Interests • 9 Indicators	• Fluor was monitoring developments, and the attractiveness of HOT lanes. • VDOT standstill prompted Fluor's unsolicited proposal under the PPTA. • VDOT followed its Implementation Guidelines to evaluate it (S,C) • No VfM Study completed by VDOT 	• Texas Transportation Commission authorized TxDOT to issue RFQ to develop project through CDA in 2005. • TxDOT performed T&R studies, surveys and advanced environmental permitting. • Highly congested and high-income users. • No V*f*M study conducted by TxDOT. 	• AB 680 passed to leverage private expertise and financing on a trial basis. • Once selected, franchisee had full responsibility for highway's development; Caltrans required completion of ROW acquisition and environmental permitting before franchisee could proceed with development. • Caltrans had oversight of private developers, but had not completed any P3 specific studies. 	• Cintra-Zachry team led development of scope. • TxDOT performed due diligence activities and obtained NEPA approval. • TxDOT prior studies indicated that segments 5 and 6 would be financially unsustainable. • TxDOT did not perform any VfM study for SH 130 (5&6). 
Stakeholder Management • 2 Interests • 4 Indicators	• VDOT engaged the citizen in its initial planning. • Citizen input about the potential of HOT lanes in lieu of HOV lane. • Once authorized, VDOT and Fluor (and ultimately Transurban) worked collaboratively and engaged citizens. 	• TxDOT conducted 4 public hearings. • Citizen support observed. 	• Citizen, citizen group, and agency (local and Govt.) agency were heavily involved (opposition) with the project progress. • Took 7 year for NEPA approval. 	• Some forms of engagement happened during preconstruction of SH 130 (5&6). 
Public Agency Capacity • 2 Interests • 2 indicators	• Developing (1 project earlier). • Relatively inexperienced (Highways). 	• Developing (1 project in progress and 1 started during procurement). • Relatively inexperienced (Highways). 	• Inexperienced at time of award; by start of construction 1 project implemented (SR 91). • Relatively inexperienced (Highways). 	• Inexperienced; first CDA project. • Relatively inexperienced (Highways). 

The revenue potential varied among the projects; I-495 and LBJ Expressway had similar profiles expansion of highly congested existing corridors via managed lanes within an urban network and higher income, time sensitive users. SR-125 and SH 130 were greenfield arterial routes expected to relieve congestion on nearby routes with an expectation that freight would account for a reasonable proportion of users. Interestingly, TxDOT had elected not to develop Segments 5 and 6 on its own. None of the public agencies completed P3 specific studies such as V*f*M analyses; rather, other drivers were observed: financial constraints that would require developing the projects incrementally with resulting delays in completion of decades.

A.4 Stakeholder Management

The stakeholder management performance dimension has two key interests and four performance indicators. Its assessment was mixed. In I-495 and LBJ Expressway, mandated public input and active engagement strategies were observed. Hence, citizen, state, and investor interests were met. As plans for SR 125 progressed, citizens and government agencies expressed opposition to the project due to ecological and environmental concerns; this ultimately delayed the project as mitigation measures were crafted and approved. In SH 130, TxDOT had informed citizens of plans about TTC-35, which was inclusive of plans for the entire SH 130 corridor. Outreach specific to Segments 5&6 is unclear. Indeed, gathering reliable data about stakeholder engagement efforts was a real challenge, so this is a limitation of this research. The assessments associated with this dimension are less conclusive.

A.5 Public Agency Capacity

Investors generally look for experienced and reliable agencies; this was assessed by considering whether the public agency had a dedicated unit for P3s (or alternative delivery) and the agency's type and years of experience. The agencies in all the four cases did not have a dedicated unit – although VDOT and TxDOT had innovative delivery and CDA program offices respectively – and their experience was developing at best. However, this did not deter the investors/producers from pursuing the four projects. Indeed, the inexperience may have provided the private developers an advantage, particularly in I-495, SH 130 and SR 125 given their private (or market) lead characteristics.

A.6 Discussion: Project Planning Performance

Table 4-17 summarizes key aspects of the project performance dimension just discussed. Figure 4-23 depicts the results of the assessment of fulfillment of stakeholder interests. These vary by each case. Highlights of planning performance for each case follow:

- For I-495, planning performance was influenced by the structure of the PPTA; its authorization of unsolicited proposals allowed Fluor to submit a conceptual proposal for HOT Lanes for private development as a PPTA once VDOT's plans to expand the congested corridor for HOV/bus transit lanes stalled. Hence, a publicly led and conventional-delivery approach shifted toward a privately led but collaborative process to negotiate the scope and terms of a comprehensive agreement for private development. In particular, the interests of VDOT (the state) and Fluor/Transurban (investors) were well-served in planning.
- For LBJ Expressway, planning performance was also influenced by the state's enabling legislation; it authorized private development of infrastructure through CDAs. Like VDOT, TxDOT was planning major upgrades to IH-635 to address severe congestion. Ultimately, the plan called for six new lanes underground at an estimated cost of $4 billion. Facing budgetary issues, the Texas Transportation Commission authorized issuing an RFQ for CDA proposals in 2004. Consequently, this project also shifted, but toward a publicly led competitive procurement of CDA proposals. Overall, stakeholders' interests were well-served in planning.
- For SR 125, AB 680 was the driver of planning as well as subsequent performance levels. It authorized up to four franchises to privately develop transportation projects and directed Caltrans to solicit proposals from interested private parties. One development team selected SR 125 as its target; this route had been identified in prior state plans and was a part of SANDAG's regional plan. Yet, the need for this project was not as evident, and Caltrans acted as a regulator or monitor of private activities. As planning progressed, the private developer encountered a variety of difficulties securing environmental clearances and community support for the project. Consequently, a franchise awarded in 1991 was not cleared for construction until 2003. Here, the fulfillment of stakeholder interests was mixed.
- For SH 130 (5&6), HB 3588 was instrumental in the planning; it authorized TxDOT to undertake planning of the Trans-Texas Corridor (a massive network of tolled facilities across the state) as well as CDAs for private development of elements of it. Subsequently,

TxDOT selected the team of Cintra-Zachry through a competitive process to support master planning of TTC-35. TxDOT had already begun development of SH 130 Segments 1-4 through a conventional approach; the Cintra-Zachry team submitted a proposal to develop Segments 5-6 through a CDA. TxDOT had opted not to proceed with these segments, which raises questions about the need for this portion of the roadway. Yet, the Cintra-Zachry team was willing to undertake the project. Negotiations and planning commenced for this arterial route parallel to IH-35. Like SR 125, fulfillment of stakeholder interests was mixed.

4.9.2 Project Management Performance Level

B.1 Procurement Process

In the procurement process performance dimension, six key interests of the four stakeholders are assessed using 12 performance indicators. Very distinct differences were found in the procurement approach among the four cases. The I-495 project was the consequence of an unsolicited proposal. In accordance with its Implementation Guidelines, VDOT called for competing proposals, but none were received, so it had no basis of comparison for the proposal – other than its differences with its own plans for the corridor. Subsequently, VDOT and CBE worked together for 5 years to further define the project reaching financial close in 2007; this was a collaborative process that gave each the room to negotiate toward mutual as well as individual interests. Alternatively, LBJ Express followed a publicly led competitive procurement process that used issued an RFQ to shortlist four teams and RFP to which two teams responded. Their procurement process included an Alternative Technical Concept

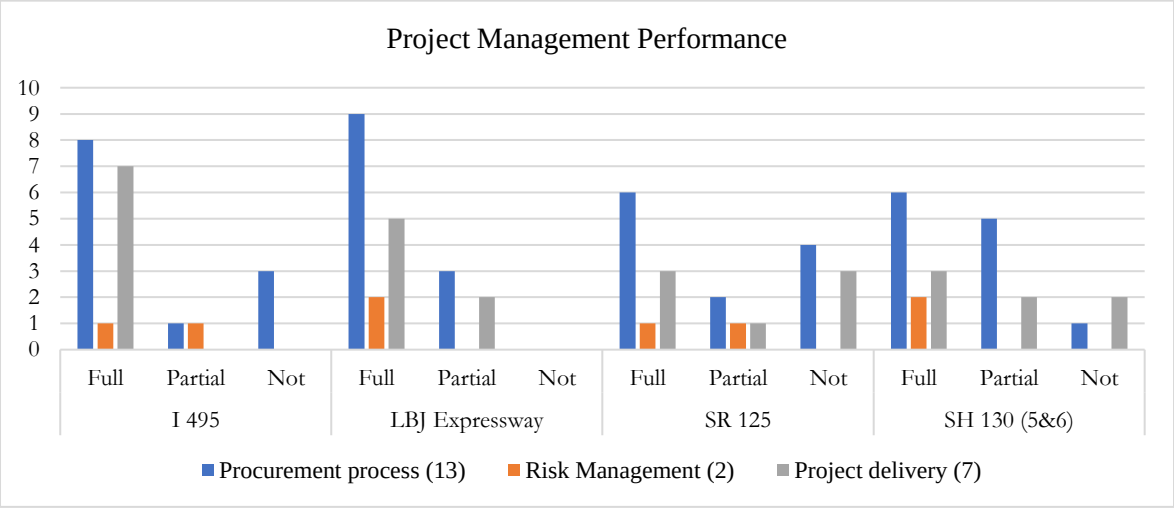


Figure 4.24 Project management performance assessment of the four projects.

Table 4-18 Cross Case appraisal of project management performance

Fully Met Partially Met Not Met

Performance dimension	I- 495	LBJ Expressway	SR 125	SH 130 (5&6)
Procedural Process • 6 Interests • 12 Indicators	• Privately led unsolicited procurement. • VDOT looked for multiple proposals but no proposal received. • Negotiation began and project has been modified; Added two new access points at Tyson square. • Transurban joined Fluor joined CBE. • Lengthy transaction period (5 years 4 months). • Concession period 80 years. • Project cost $ 2.06 Billion. 	• Publicly led competitive procurement. • The procurement process had followed the RFQ and RFP process. • Four consortiums shortlisted and two submitted proposals. • ATC process included in RFP. • Procurement process and outcome communicated. • Concession period 52 years. • Project cost $ 2.36 Billion. 	• Publicly led procurement. • 10 firms responded to the RFQ and 8 responded to RFP. • Process proceeded incrementally, so Caltrans and respondents had little knowledge of how this would process would proceed. • No basis for comparison of the SR 125 proposal. • Franchise period 35 years. • Project cost $668 million (well above expected.) 	• Privately led unsolicited procurement. • Following a competitive process, TxDOT selected Cintra- Zachry to prepare a master development plan for the entire TTC-35 corridor. • TxDOT did not seek competing proposals. • Concession period 50 years. • Project cost $ 1.3 Billion. 
Risk management • 2 Interests • 2 Indicators	• Revenue sharing on base case. • $ 409 Million public contribution. • No debt liability met the VDOT interest. • Transfer of construction risk (busy corridor). 	• Revenue sharing on base case. • $490 Million public contribution. • No debt liability on TxDOT. • Transfer of construction risk (busy corridor). 	• CTV, MIG and lenders took considerable risks including construction and delivery. • Adding an important asset into the Caltrans portfolio. 	• No state or public funding. • Revenue-sharing mechanism. • No debt liability on TxDOT. 
Project delivery • 3 Interests • 7 Indicators	• On time and on budget without any major incident. • Delivered more than 30,000 construction notices. • Opened to traffic Nov. 2012 (ahead of schedule). 	• Innovative design and construction. • Project completed on time and on budget on without any major incident. • Opened to traffic Nov, 2015 (ahead of schedule). 	• $344 million project that escalated to $668 million. • Construction began in May 2003 and concluded in November 2007 (13 months behind). 	• Project was completed ahead of one-month time. • Opened 3 months ahead of deadline. 

(ATC) process that allowed the winning bidder to submit an alternative plan for the project's managed lanes; further, it made nearly $1 billion in public funds available, but the winning bidder requested only $490 million.

SR 125 was also a publicly led procurement process where 10 firms responded to the RFQ and 8 responded to RFP; however, Caltrans was soliciting unique proposals from the private respondents, so it had to fashion a generic evaluation scheme since it did not know the scope of forthcoming proposals. Finally, SH 130 (5&6) was another privately led unsolicited proposal; similar to VDOT, TxDOT had no basis of comparison for this proposal. The Cintra-Zachry team took point on planning the project and negotiating its terms with TxDOT. The transaction periods for I-495 and LBJ Expressway were relatively long, taking roughly 5 years. The SH 130 CDA agreement was reached within 1.5 years. For SR 125, the franchise agreement required CTV to get the environmental approval prior to signing the final agreement, which eventually took 9 years. The procurement process dimension had mixed results. In particular, the lack of competing proposals in I-495, SR 125 and SH 130 did not serve the state's significant interest in receipt of "best value"; some might argue that SR 125 was selected competitively, but Caltrans still had no basis of comparison for the proposal – not even, its own plan for this highway.

B.2 Risk Management

This dimension assessed two key interests with two indicators. Each of the case projects were delivered as DBFOM arrangements. Overall, the risk allocation followed prevailing practices typical of these arrangements. In general, revenue risk, debt liability, construction risks, and O&M were transferred to the concessionaire of four projects. Revenue sharing with the state was found in all cases except SR 125. Here, the SR 125 agreement allows the franchisee to establish pricing and cost structures to attain an IRR of 18.5%. In addition, the franchisee carried the responsibility for ROW acquisition and environmental permitting; as mentioned, the latter in particular resulted in significant issues for this project.

B.3 Project Delivery

The project delivery dimension considers four interests and five performance indicators. I-495, LBJ Expressway and SH 130 were constructed within budget and on time (two of three ahead of schedule). SR 125 was different; aside from the delays to the project, construction itself did not go well. The cost of the SR 125 project increased from $390 million to $658 million and also took an additional 13 months to complete. The other cases

met stakeholder interests in this dimension, but SR 125 did not meet state, investor or producer interests.

B.4 Discussion: Project Management Performance

Again, Table 4.18 summarizes key aspects of the performance dimension just discussed. Figure 4.24 depicts the results of the assessment of fulfillment of stakeholder interests. Highlights of project management for each case follow:

- For I-495, the dimensions of risk management and project delivery met the vast majority of stakeholder interests. However, the procurement process dimension had a significant shortcoming for the state. As discussed, the lack of competing proposals did not allow VDOT the opportunity to evaluate multiple proposals for best value. Further, negotiations led to a financial structure where a $409 million subsidy was included, which was 20% of the project's total funding. Hence, the state had a large commitment toward the project. VDOT arguably did receive and advance a better project than the one it was contemplating.
- For LBJ Expressway, the procurement, delivery and risk management dimensions met nearly all of the stakeholder interests. In particular, the procurement process was notable for its structure and performance specifications; the winning bidder developed an innovative cut and cantilever method to construct the managed lanes while the corridor remains in operation.
- For SR 125, all three dimensions had shortcomings for stakeholder interests. The procurement was "quasi-competitive" – in addition to SR 125, seven other alternative project concepts were brought forward, and Caltrans had no basis for comparison to evaluate best value. Risk management shifted ROW acquisition and environmental permitting responsibilities to the franchisee, which resulted in a significant delay. Further, the franchisee had control over pricing and cost to attain an IRR of 18.5%. Finally, project delivery saw costs increase nearly 100% and a schedule slippage of 13 months.
- For SH 130, the procurement dimension was similar to I-495; TxDOT did not seek competing proposals, so it had no basis to consider best value. Negotiations did result, however, in the state receiving an upfront concession fee of at least $25 million.

4.9.3 Business Performance

C.1 Service Quality

Service quality considers interests of the state and user/citizen with associated indicators. The I-495 and LBJ Expressway managed lanes projects successfully improved trip times, reduced congestion, and improved infrastructure conditions, so these projects met the VDOT, TxDOT and respective citizen/user interests. Once opened, the general purpose of SR 125 was also met; it established direct connectivity with the US Mexico border and reduced congestion pressure on I-905 and I-805, serving both state and users/citizens. In SH 130, the outcomes have been different; pavement cracking was discovered in 2014, and the speed limit of 85 MPH, which TxDOT permitted upon receipt of a $125 million concession fee in 2012, became a source of accidents and safety concerns for both state and users. Hence, the interests have not been met for TxDOT and users. However, this project changed ownership following its bankruptcy in 2016; under its new owner, the situation has steadily improved – including an initiative to reduce toll rates.

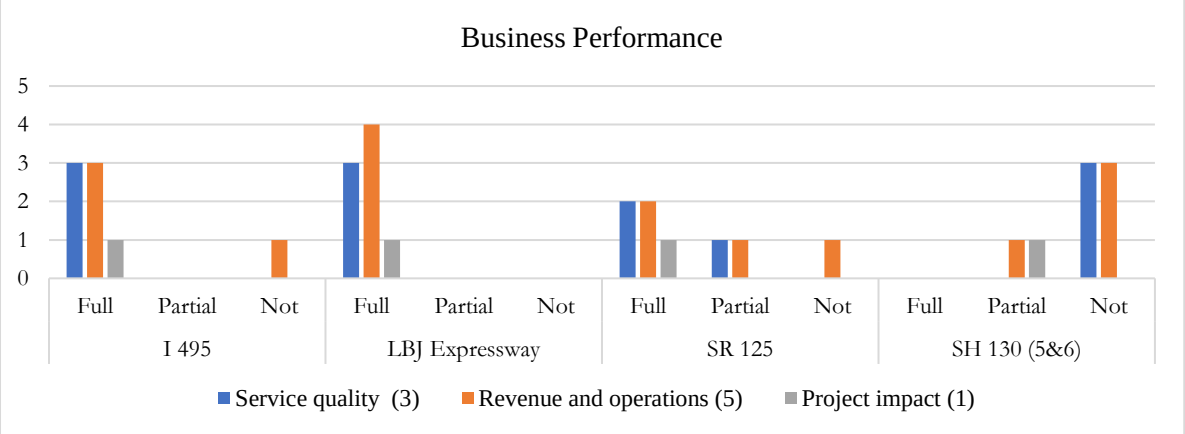


Figure 4.25 Business performance assessment of the four projects.

Table 4-19 Cross Case appraisal of business performance

Performance dimension	I-495	LBJ Expressway	SR 125	SH 130 (5&6)
Service Quality • 3 Interests • 3 Indicators	• Congestion improved. • Speed limit improved (65 now ML). 	• Congestion improved. • Speed limit improved (55 MPL, ML). 	• SR 125 became an integral part of San Diego traffic network (S,U). • Caltrans has less oversight on SANDAG since they took over the project. 	• Pavement flaws. • SH Concession Company penalized by TxDOT and notified multiple times. • New owner taking care of pavement issues. 
Revenue and Operations • 2 Interests • 4 Indicators	• Ramp up period: below expectation (average 60% of projected). • Equity divested (Transurban). • Post ramp up- Meeting expectations. • COVID 19 – Positive trend. 	• Traffic met the expectations since the opening of the project. • No equity divested. • COVID - Positive trend. 	• SR125 faced bankruptcy and investor, producer and lender lost part to fully divested their investment. • SANDAG (New owner) – Toll reduction, increase of traffic. Traffic revenue positive trend from Q 2, 2015. • COVDI impact – high negative impact. 	• SH 130's, traffic projections never materialized. • By the end of 2016, after the P3 concessionaire had filed for bankruptcy, traffic demand in SH 130. 
Project Impact • 1 Interests • 2 Indicators	• Job growth. • Increase commercial activities. 	• Job growth. • Increase commercial activities. 	• Job growth and increase commercial activities. • New port of entry at the US- Mexico border. 	• No definitive information available. 

C.2 Revenue and Operations

The revenue and operations performance dimension has two key interests and four indicators. These four projects opened to traffic in four different periods (as shown in Figure 4.26 (Perez et al. 2016), so these circumstances likely impacted the traffic and revenue projections. For instance, I-495 experienced 40% less traffic than expected in the ramp up period (2012-2015). This forced Transurban to invest an additional $480 million in the project to shore up its financial situation. From 2016 onwards, the project began to meet its traffic and revenue projections. Alternatively, LBJ Expressway has generally met its revenue expectations; a refinancing of the project's PABs took place in 2020, and Fitch rated LBJ Managed Lanes' PABs Series 2020A and 2020B at BBB- with "Outlook Stable".

SR 125 and SH 130 have experienced similar outcomes; traffic was less than 30% of the expected projection. While SR 125 opened in the peak period of the 2008 recession, SH 130 traffic projections were considered aggressive. In addition, TxDOT put the concessionaire on notice multiple times and levied financial penalties for lack of compliance with operational standards. Subsequently, the two projects declared bankruptcy in November 2011 and July 2016, respectively. Both projects emerged from bankruptcy under new ownership; SANDAG purchased SR 125 (now more commonly known as South Bay Expressway) while Strategic Value Investors gained the majority stake in SH 130. In particular, SR 125 has experienced a "second life", principally due to SANDAG's different objectives as an owner compared to a private entity. The outlook for SH 130 remains unclear, but the new owners have reduced toll

rates and made upgrades to the facility (pavement replacement).

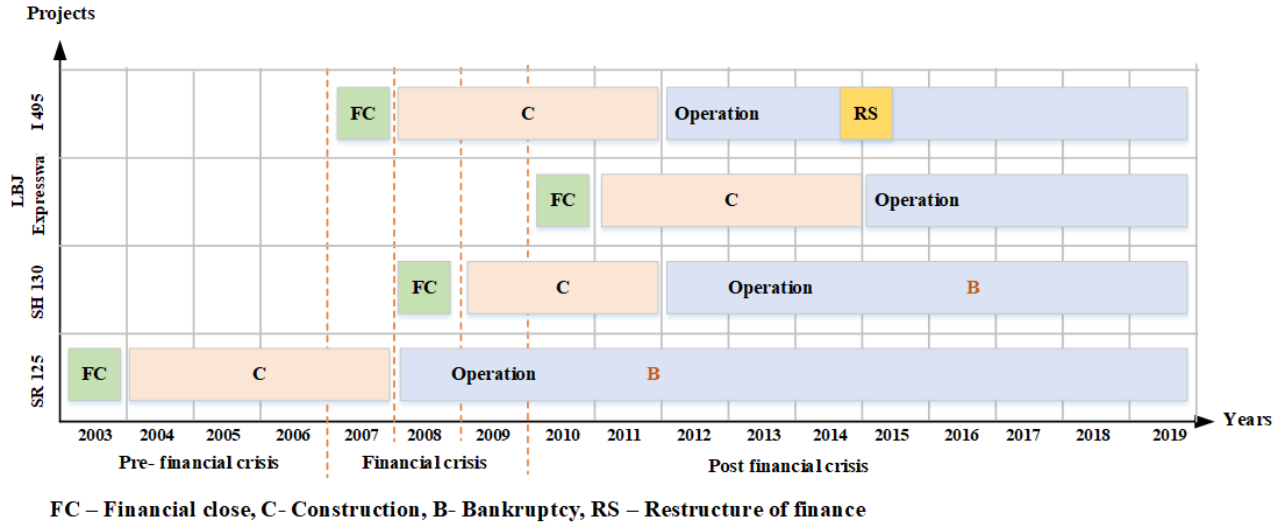


Figure 4.26 Years of planning, construction, operations, and bankruptcy filing for projects considered.

C.3 Project Impact

This performance dimension considers whether the project adds value to citizens/users. I-495, LBJ Expressway have made impressive claims about job creation and commercial development as a result of the project. For example, VDOT and CBE have claimed 31,000 jobs and economic gains of $3.5 billion while LBJ Expressway reported 7,000 new jobs during its first year of operations, and $2 billion in economic impacts. For SR 125, an AASHTO study concluded a 4% increase in the number of jobs (AASHTO 2018). Impacts related to SH 130 are yet unknown, but some commercial developments appear imminent in Lockhart, TX region.

C.4 Discussion: Business Performance

Once more, Table 4.19 summarizes key aspects of the performance dimension just discussed. Figure 4.25 depicts the results of the assessment of fulfillment of stakeholder interests. Highlights of business performance for each case follow:

- For I-495, the project has met its purpose; however, traffic and revenue were below expectation at the outset, which caused Transurban to invest additional equity. The current outlook appears stable.

- For LBJ Expressway, the project has met its purpose, revenue, and operations expectations and has claimed project impacts.
- For SR 125, its bankruptcy in 2011 was a consequence of traffic and revenue shortfalls; it emerged from bankruptcy under SANDAG's ownership and has a positive outlook.
- For SH 130, it has fallen short across all three performance dimensions. Its bankruptcy in 2016 was unsurprising. It is now under new ownership, but it is still plagued by legacy issues such as on-going litigation about pavement cracking that appeared in 2014.

4.9.4 Future Potential

Aside from these three performance levels, trends in the service delivery phase indicate that the future potential of three of the four projects is high. I-495 appears to be on a stable footing and it has spawned further managed lanes initiatives in Virginia, the I-495 Northern Extension and I-66 Outside the Beltway, and in Maryland, I-495/I-270. Moreover, I-495 is regarded as a hallmark project for the P3 industry. The strategic location of LBJ Expressway has made it an integral part of the urban network; 225,000 vehicles are using this highway each day. SANDAG has taken various initiatives to better SR 125 overall including outreach activities to attract the users to the facility. SANDAG is also actively working with legislators to open a third port of entry with Mexico to bolster SR 125 patronage. Similarly, the new owner of SH 130 (5&6) has taken some strides to improve its circumstances such as reduction of toll rates so that using SH 130 becomes more cost effective.

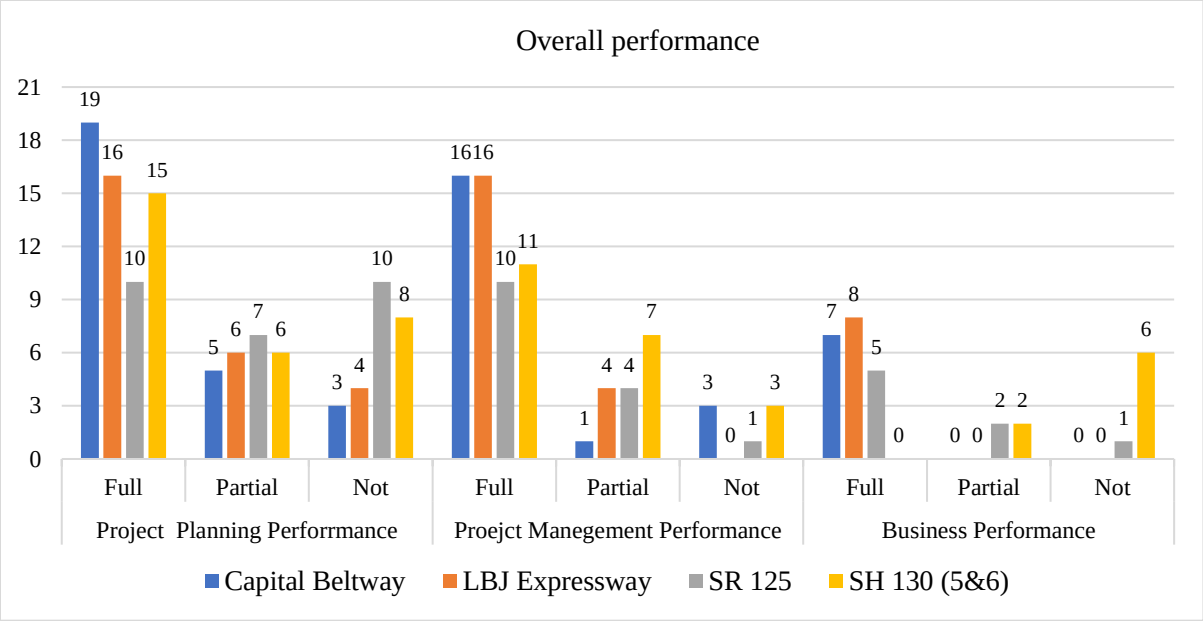


Figure 4.27 Cross case performance assessment

4.10 General Observations from the Case Studies

The case study produced several general observations that complement the assessment of planning, project management and business performance as well as future potential. Influence diagrams shown in Chapter 7 supported drawing these observations.

4.10.1 Setting the Stage: Distinct Enabling Legislation but Similar Objectives

In each of the four cases, the respective states initiated and subsequently passed legislation that contained key elements for providing opportunities for private participation through P3s. These legislative and regulatory frameworks were distinct but exhibited similar goals; the legislation in Virginia and Texas was broad, but California's was limited to its pilot projects. Yet, the overall objective was to expedite delivery of a needed transportation infrastructure in a cost-effective and efficient manner through private investment. Overall, these acts varied in their conditions, but they shared the objective of establishing a favorable project environment to develop these four P3 projects. The legislation set the stage for what transpired. Further, it sends a strong signal that a state is open to private involvement in infrastructure financing and delivery and provides predictability for the private sector engaging in a partnership with the public sponsor (Geddes and Wagner 2013).

4.10.2 Unique P3 Determination

How each project wound up as a P3 was unique; this variance is a consequence of each state's planning process, its progress and state economic conditions such as limited public debt capacity. In all cases, the roots to develop the projects as P3s were dissimilar – although they shared some characteristics. For I-495, VDOT's P3 determination process started only when Fluor submitted its unsolicited proposal; prior it was planning a conventional delivery that was proving cost prohibitive. Similarly, TxDOT was exploring conventional options to improve the LBJ IH-635 corridor, but it also lacked funding. Consequently, TxDOT opted to pursue a P3 through a competitive procurement process, expecting that the P3 approach would overcome the funding barrier and accelerate delivery. In SH 130 (5-6), TxDOT was reluctant to develop these segments, but Cintra-Zachry came forward with an unsolicited proposal that the state found attractive. In the case of SR 125, California legislators initiated a pilot program through the passage of AB 680 to develop four privately developed transportation projects. After rounds of short-listing and proposal evaluation, Caltrans selected SR 125 for development through a private franchise structure; effectively, the private developers were granted the freedom to select P3 projects that fit their needs while complying with the guidelines established by Caltrans.

4.10.3 Competition or Collaboration?

The I-495 and LBJ Expressway cases present a potential dilemma. As noted previously, a competitive selection process is a longstanding principle of public procurement. If the LBJ Expressway project was examined exclusively, then this case would clearly reinforce the necessity of this principle; the competitive tension in the procurement drove the public contribution down considerably and generated a novel technical solution for the managed lanes. Contrasting the I-495 case against it, however, creates a different picture. The VDOT and Fluor-Transurban collaboration shaped a project that not only added the managed lanes but also included needed upgrades in the project's corridor. VDOT ultimately contributed $409 million (which interestingly is roughly the same amount of public funds in LBJ Expressway) toward the project, so these upgrades had a cost; nonetheless, the parties settled on mutually acceptable terms. Today, both projects are functioning as expected and are stable financially. Was one outcome better than the other? This question remains unanswered, although it is difficult to

conclude that the price of I-495 was the "best" available. It is clear, though, that the pathway toward stakeholder satisfaction with respect to this issue is not straightforward.

4.10.4 Nascent Predevelopment Agreement

Predevelopment Agreements (PDAs) provide a mechanism for an investor/producer to collaborate with DOTs for the conceptual, preliminary, and final planning of a project, typically along with first rights to provide certain services in the development of a project (USDOT 2010). The collaboration witnessed in the I-495 case is illustrative of an early PDA. Once VDOT and Fluor-Transurban executed the interim comprehensive development agreement in April 2005, the parties collaborated and negotiated the project's scope as well as its commercial and legal terms until financial close in December 2007. Indeed, I-495 exemplified the characteristics of a PDA since the parties were working to fulfill mutual and individual interests. Today, public agencies and private developers are increasingly interested in this model of project planning and development.

4.10.5 Influence of Stakeholder Management

In each case, stakeholder management influenced outcomes, but I-495 and SR 125 are particularly illustrative of the influence of impacted stakeholders on P3 projects. In I-495, citizens were not supportive of VDOT's planned HOV lanes and with its massive footprint and price tag; however, Fluor's proposed HOT lanes were far better received, which benefitted the project's concept. The SR 125 case is indicative of how citizen opposition can alter a project's course. SR 125 developers had to address many citizen and social concerns as they struggled to obtain necessary environmental clearances, which resulted in significant delays and additional costs.

4.10.6 Strategic Opportunities: Private and Public

The cases illustrated strategic moves by both private and public organizations. Cintra-Zachry likely viewed SH 130 (5&6) as a project within a far larger program, TTC-35. Getting a CDA underway and established would create a foothold within TTC-35, which would likely lead to further projects. Unfortunately, neither SH 130 nor TTC-35 wound up working in favor of Cintra-Zachry within Texas. Transurban's decisions in I-495 also appear strategic; it found a US-based partner already pursuing a managed lanes corridor project within a larger regional

network. Its position within I-495 set up follow-on opportunities that it landed: I-95 Express Lanes, I-395 Express Lanes and I-495 NEXT. Finally, SANDAG's purchase of SR 125 was also a strategic move. Acquiring the distressed asset at a premium, SANDAG has repurposed the roadway to benefit the agency and the region; it is now an important piece of SANDAG's regional mobility network.

4.10.7 Risk Transfer Vs. Public Contributions

Overall, the risk management in these cases reflects the characteristics of P3s structured as DBFOM arrangements – excepting SR 125 where CTV took on nearly all the development risks including obtaining environmental clearances and right of way acquisition. Concessionaires assumed risks of design, construction, operations and maintenance. All four cases were revenue risk arrangements, so they held these risks as well. Three of the cases – I-495, LBJ Expressway, and SH 130 (5&6) – had revenue sharing arrangements in place where the DOTs receive excess revenues if certain thresholds are met. However, public budgetary contributions were made in I-495 and LBJ Expressway, where each state provided roughly 20% of the funds required. While no state funds were provided in SR 125 and SH 130 (5&6), all four cases included a federal TIFIA loan in the financial structure. Consequently, the public contributions ranged from approximately one-third to one-half of the total capital requirements for each project, so the significance of these state and federal contributions is clear. Moreover, the public contributions somewhat offset the risks transferred.

4.10.8 Efficient and Effective Project Delivery

In large-scale projects, a major interest among the stakeholders in the implementation phase is the effectiveness of project delivery. Two important metrics capture implementation: cost growth and schedule variance (shown in Figure 4.27). All the projects except SR 125 were completed on time and within budget. Even after significant delays in its construction start, SR 125 took an extra year to complete. These outcomes illustrate those three of the four projects demonstrated cost and schedule certainty; this is particularly critical to investors in revenue risk arrangements since on-time openings mean no delays in revenue collection. In addition, the outcomes are indicative of the skills and expertise of the private development teams since each

of the projects were large and complex undertakings.

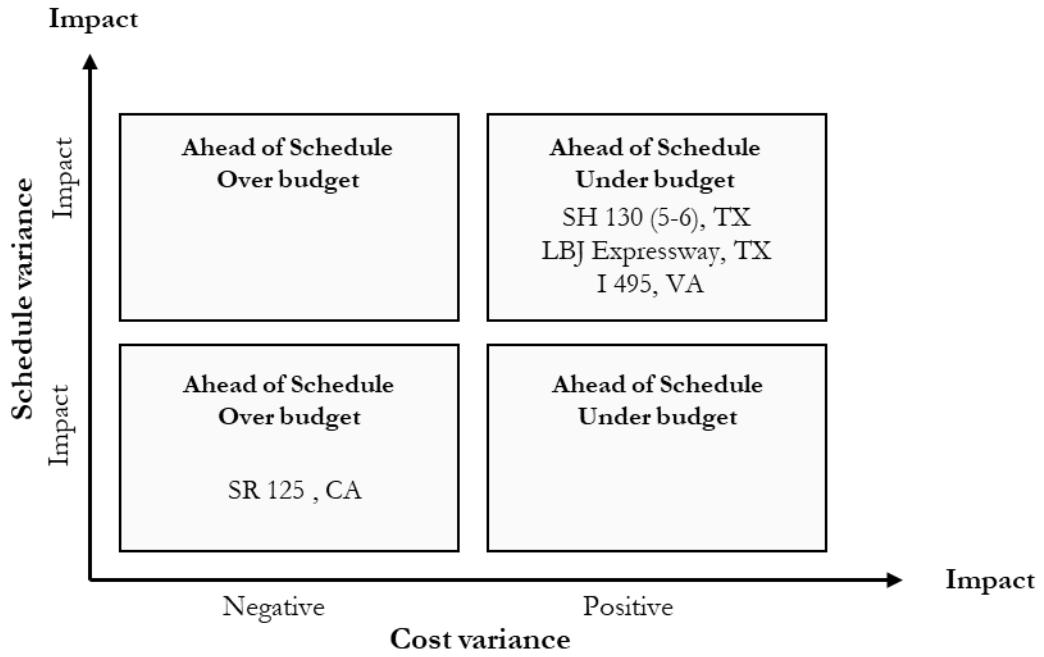


Figure 4.27: Schedule and cost variances of the selected projects.

4.10.9 Traffic Forecasting Issues

Three of the four cases had traffic forecasts that were higher than the actual traffic. This created issues for each of these cases. Why was traffic demand overestimated? Two explanations are possible. First, the assumptions behind the forecasts were unrealistic, and second, the demand numbers were ambitious to secure debt financing. The phenomenon of optimism bias in traffic forecasting is well documented (Bain 2009). Both SR 125 and SH 130 (5&6) were arterial greenfield routes that depended on sources of traffic that did not occur. Both of these routes were also affected by non-tolled parallel routes. Even I-495, a congested urban corridor with few competing routes, fell below expectations. A spokesperson for I-495 explained the disappointing numbers in the ramp-up phase as a consequence of the change in traffic patterns in the region: “we've opened a highway within a highway" (Liz Essley 2013). In short, forecasting demand for tolled facilities remains a challenge, but this challenge is particularly acute in revenue-risk arrangements that are project financed.

4.11 Limitations of the Study

This study has some limitations. First, interpretations of the data were necessary within and across the cases, which may qualify some findings and limit generalizations. For example, the P3 determination performance dimension involves several interests and indicators and the causal relationship among the factors is not precisely known. However, the authors have made efforts to make the assessments and evaluations of stakeholder interests and their corresponding performance dimensions objective and transparent. Still, caution is warranted when generalizing the effect of various factors across these four cases (George and Bennett 2005).

Secondly, the evidence for this study relied on available project documents, information, and reports. In some instances, data was not available to support assessments of some interests or data was self-reported. In particular, stakeholder engagement source data was difficult to collect, so findings relative to stakeholder strategies and input were limited. Interviews were also conducted with personnel involved in each of these projects to complement the other source data. However, interviewees were providing their perspective of these projects, so their views are not unbiased. Where possible, the interview data was matched with findings from other sources to triangulate it. Unfortunately, some interview data could not be triangulated, so it was not incorporated. Finally, project personnel from SR 125 and SH 130 were reluctant and in some cases unwilling to talk about these projects since they have undergone bankruptcy or are still facing issues, i.e., pending litigation. Consequently, these cases had fewer interviews completed.

4.12 Conclusion

Governments have expanded the use of P3s in transportation in hope of increasing public welfare. Investors and producers put their equity and expertise into such projects to build the highways in anticipation of economic returns while users patronize these facilities and citizens are either impacted by or interested in them. All of these stakeholders' interests vary. In this study, we have investigated how and why these key stakeholder interests have been met or not. To tackle this, we developed a framework comprising key stakeholders' interest in six stages/phases of a P3 project. We utilized 30 key interests of the four stakeholders and 67 indicators to assess their expectations. Individual cases were analyzed in depth using performance dimensions as the central sub-unit of analysis; these dimensions correspond with four performance levels. Consequently, each case can be characterized by its performance

dimensions and its level of performance. Overall, I-495 and LBJ Expressway met stakeholder interests across the 11 performance dimensions and had stronger planning, project management and business performance than SR 125 and SH 130. In addition, the future potential of these two projects is also more promising.

The significance of this effort is threefold; first, it provides a basis for systematic assessment of P3 stakeholder interests that form the basis of more aggregate assessments. Second, this case study goes beyond existing conceptual frameworks to present and analyze actual data from current projects, albeit with its noted limitations. Finally, the study will help P3 practitioners or policy makers to identify key factors that will influence stakeholder interests and subsequently project performance.

Chapter 5 Conclusions, Contributions, and Implications

5.1 Conclusions

5.1.1 Summary of Findings

My research was designed to examine P3 performance from the perspective of stakeholder interests through three sequential studies. The first identified and synthesized assessment factors such as CSFs and KPIs found in the literature. The second linked these assessment factors to develop a performance assessment framework, and the third utilized the assessment framework to conduct a case study of four P3 projects in the USA to examine how well they performed by assessing the fulfillment of stakeholder interests.

The first study focused on how researchers and practitioners utilize various assessment factors such as CSFs, KPIs and their linkage to P3 objectives and outcomes. Hence, a systematic literature review was completed to characterize CSFs and KPIs proposed for P3s. The study found that: (1) some authors use the terms CSFs and KPIs interchangeably, (2) CSFs and KPIs are not routinely linked with P3 phases/stages, and (3) CSFs and KPIs are typically addressed independently. Consequently, a CSF-KPI framework was proposed. The CSF-KPI framework integrates various factors and indicators related to the phases of P3 projects while associating relevant CSFs and KPIs with their respective lifecycle phases. This better supports their utilization by both researchers and practitioners for evaluating P3 outcomes and performance. Further, it enables a holistic view of P3s for public and private sector stakeholders interested in P3 projects.

The CSF-KPI framework developed in Study 1 served as a key input for the second study. It developed an assessment framework to determine the extent that the interests of the state, investors, producers, and users/citizens are met during a P3 project. The developed P3 stakeholders' interests register formed the basis of the assessment framework. The register is linked with 11 performance dimensions and four levels of performance in such a way that interests of the key stakeholders are captured under each performance dimension and subsequently fulfillment of stakeholder interests can be assessed by each dimension. Additionally, specific performance dimensions are combined in four levels of performance – planning, project management, business, and future potential – which supports scalable

assessment. Overall, the framework's design supports assessing the fulfillment of stakeholder interests by each dimension, by each level, and in aggregate. To demonstrate and substantiate the framework, it was applied to the Capital Beltway Express (I-495) P3 in Virginia.

The third study conducted a case study of four P3 highway projects to see how well the four stakeholders' interests were fulfilled over the lifecycle of four projects: I-495 in Virginia, LBJ Expressway in Texas, SR 125 in California, and SH 130 (5&6) in Texas. The subsequent sections provide a summary of the findings by each level of performance for the four cases.

Project Planning Level

In the project planning performance level, five performance dimensions were evaluated. A summary of the assessment for each case follows.

I-495

Across the five performance dimensions, the I-495 case fully or partially met the vast majority of the stakeholder interests assessed. The *project environment* and the *P3 determination* dimensions were particularly important to how this project unfolded. Foremost, the PPTA legislation enabled the submission of the unsolicited proposal by Fluor. Undoubtedly, Fluor found the prospect of a managed lanes project very attractive, so it submitted the proposal despite VDOT's limited P3 experience (a modest shortcoming in the *public agency capacity* dimension). Fluor's proposal provided a more feasible and acceptable solution than VDOT's plan, which had stalled. In addition, the existing implementation guidelines were flexible enough to allow VDOT, Fluor and Transurban to collaborate to reach agreeable terms for the project.

LBJ Expressway

Similarly, the LBJ Expressway case fully or partially met the vast majority of the stakeholder's interests across the five performance dimensions. The *project environment* and the *P3 determination* dimensions played a major role in the development of the project. HB 3588 legislation authorized CDAs for transportation projects, and it was critical to the TxDOT's decision to utilize a P3 when the project planning of LBJ Expressway was at a standstill since estimated costs far exceeded budgetary funds. Undoubtedly, without the option of a CDA, TxDOT could not have proceeded with the LBJ Expressway development. This decision altered

the project's timeline, structure, and trajectory of the project. TxDOT decision to pursue a P3 under the legislation led to the subsequent outcomes.

SR 125

Unlike I-495 and LBJ Expressway, many stakeholder interests were either partially met or not met in the SR 125 case across the five dimensions. The *project environment* and the *P3 determination* dimensions were particularly important to how this project progressed. First, the process to develop SR 125 was significantly shaped by the AB 680, which employed a unique pilot program arrangement that was specific and limited. Still, investors and producers showed interest in participating by submitting unique private proposals for transportation projects throughout the state despite Caltrans lack of experience (a shortcoming in the *public agency capacity* dimension). Once SR 125 was selected as one of the pilot projects, its developers were responsible for all aspects of the project, including environmental permitting and ROW acquisition. Severe public opposition (a key component of the *stakeholder management* dimension) created many challenges and uncertainties for the SR 125 team; this delayed the environmental permitting process, which ultimately took 7 years.

SH 130 (5&6)

Across the five performance dimensions, the SH 130 (5&6) case fully or partially met the vast majority of the stakeholder interests assessed. Like the other three cases, the *project environment* and the *P3 determination* dimensions particularly influenced the project's development. During its own planning, TxDOT found the SH 130 (5&6) portion of the SH 130 corridor project was not feasible as a P3. Subsequently, the Cintra-Zachry team submitted an unsolicited proposal for P3 development under a CDA; Cintra-Zachry had been selected to support TxDOT's plans for TTC-35, which was a consequence of HB 3588. TxDOT accepted the Cintra- Zachry proposal, so the project proceeded as a P3 with the Cintra-Zachry team leading its development.

Summary

Overall, the planning performance for I-495, LBJ Expressway and SH 130 (5&6) were comparable since most stakeholder interests were fully or partially met. I-495 was notable for its collaborative planning whereas TxDOT's deliberate decision to pursue a P3 for LBJ Expressway

distinguished this case. Both SH 130 (5&6) and SR 125 were privately led initiatives, but the SR 125 developers assumed more responsibilities and risks.

Project Management Level

In the project management performance level, three performance dimensions were evaluated. A summary of the assessment for each case follows.

I-495

The I-495 case fully or partially met the vast majority of the stakeholder interests assessed at this level. In the *procurement process* dimension, VDOT was unable to establish a best value process, which was a significant shortcoming. However, the negotiations between the parties enabled by the interim comprehensive agreement resulted in a mutually acceptable project. In the *risk management* dimension, VDOT contributed $409 million in project funding (20% of total), but it secured a revenue sharing arrangement and these funds supported improvements to the corridor's general-purpose lanes. I-495 was delivered on time and on budget without any major incidents, so the *project delivery* dimension was very strong.

LBJ Expressway

The LBJ Expressway case fully or partially met the vast majority of the stakeholder interests assessed at this level. *Procurement process* and *project delivery* dimensions were particularly strong. First, TxDOT established a best value approach for the project's procurement, which led to an innovative technical solution, reduced the project's expected cost, and decreased the public sector's budgetary contribution. Second, the project was delivered on time and on budget with no major incidents in a busy corridor.

SR 125

Unlike I-495 and LBJ Expressway, many stakeholder interests were either partially met or not met in the SR 125 case. In the *procurement process* dimension, Caltrans solicited unique proposals from the private sector where the prospective franchisees were transferred responsibility for defining the scope of project. This process eventually led investors and lenders to take significant risks which negatively influenced the *risk management* dimension. It took the franchisee, CTV, seven years to secure the necessary environmental permits. Consequently, these delays escalated the project's costs from $344 million to $668 million; once construction

started the project's completion was further delayed by over a year. Hence, the *project delivery* dimension was a key shortcoming.

SH 130 (5&6)

Fulfillment of stakeholder interests were mixed for the SH 130 (5&6) case. In the *procurement process* dimension, TxDOT accepted the unsolicited proposal from Cintra-Zachry without seeking competing proposals, so a best value process was not established – similar to I-495 – which was a key shortcoming. However, the TxDOT did secure lucrative terms for the project. In the *project delivery* dimension, the project was completed on time and on budget.

Summary

Overall, in the project management performance level, LBJ Expressway was the only case where a best value procurement was followed. Project delivery was comparable for I-495, LBJ Expressway and SH 130 (5&6); however, SR 125 had significant delivery issues that resulted in delays and increased costs.

Business Performance

In the business performance level, three performance dimensions were evaluated in each of the four projects. A summary of the assessment for each case follows.

I-495

Fulfillment of stakeholder interests was mixed for I-495. The *Service quality* dimension was strong where trip reliability and congestion conditions improved significantly. In the *revenue and operations* dimension, traffic shortfalls in the ramp up period required Transurban to infuse an additional $280 million in equity and release $150 million in reserves to restructure the project's debt. This was a significant shortcoming, but Transurban's actions stabilized the project.

LBJ Expressway

All the stakeholder interests were fully met in the LBJ Expressway. For instance, congestion has lessened, and traffic has met expectations since the project's opening, so *service quality* and *revenue and operations* dimensions were quite strong.

SR 125

Like other levels, the fulfillment of stakeholder interests for SR 125 was mixed. The *revenue and operations* dimension was a particular issue; SR 125 faced severe revenue shortfalls in its first three years, which ultimately led to the project's bankruptcy. Investors incurred losses, but the state did not.

SH 130 (5&6)

Fulfillment of stakeholder interests was a particular challenge for SH 130 (5&6). *Service quality* and *revenue and operations* dimensions had significant issues. First, pavement construction flaws were observed in the first year of operations, and the increased 85 mph speed limit created safety concerns. Second, severe revenue shortfalls caused SH 130 (5&6) to file for bankruptcy. Investors incurred losses, but the state did not.

Summary

Overall, the business performance level was far stronger for I-495 and LBJ Expressway compared to SR 125 and SH 130 (5&6). LBJ Expressway was strong across all dimensions whereas I-495, SR 125 and SH 130 (5&6) had revenue shortfalls. While I-495 was able to recover, neither SR 125 nor SH 130 (5&6) were able to do so. In addition, SH 130 (5&6) had technical issues, which are still in litigation.

Future Potential

I-495 spawned further managed lanes initiatives in Virginia, the I-495 Northern Extension and I-66 Outside the Beltway, and in Maryland, I-495/I-270. The strategic location of LBJ Expressway has made it an integral part of the Dallas network. SANDAG is also actively working with legislators to open a third port of entry with Mexico to bolster SR 125 patronage. Finally, the new owners of SH 130 (5&6) have taken steps to bolster the project's outlook by reducing the toll rates to attract more traffic.

In aggregate, I 495 and LBJ Expressway showed stronger planning, project management and business performance than the other two projects SR 125 and SH 130 (5&6).

5.1.2 Lessons learned – Utilization of P3s

Utilization of P3s is associated with many challenges and unknowns. Similarly, the extent of these challenges is visible and reflected in these four cases throughout their project development. Overall, key lessons learned are as follows:

Enabling Legislation

Individual projects depend on whether the legislation needed at the time of P3 procurement is in place or is necessary before a project can proceed on a P3 basis. It is worth noting that currently, 39 states have passed legislation allowing the use of P3s (NCSL, 2017). In all four cases the enabling legislation supported the process of development and subsequent, though varied, procurement. Hence, the types of P3 arrangements that are permitted are typically determined by a state's legislative framework, which may also define project selection, funding, project management, and relevant policies. States may also establish specific policies that guide P3 project development in addition to enabling legislation. For instance, a stable socio-political environment can limits the risks for the investor and producers through (1) clearly defined legislative or executive oversight processes, and (2) legislative or executive guidelines that define any stakeholder engagement requirements. Alternatively, users and citizens will expect means to influence the development process; this can be done through (1) defining and following a process for accepting/approving projects as P3s, and (2) mandating meaningful opportunities for citizen/community input and engagement.

Implications Due to Limited Competition

Though P3s provide opportunities for private investors and producers to engage in infrastructure development, it is evident from the cases that only a small number of private entities were interested or able to develop such projects. For instance, only Fluor submitted an unsolicited proposal and subsequently VDOT did not receive a second proposal. In the case of LBJ Expressway, four teams responded to the RFQ, but the final evaluation was held between two bidders only. In addition, two separate consortiums led by Cintra were involved in LBJ Expressway and SH 130 (5&6). Hence, a relatively small numbers of bidders means less competition, which has implications for the state and citizens. For instance, the state must balance many different policies when establishing procedures for accepting unsolicited proposals, and it will have difficulty in following a best value approach. Further, negotiations

may lead to state budgetary contributions as scope is increased or modified. Overall, these implications create challenges for transparency and accountability in P3s.

Tracking P3 Performance

Assessing the performance of P3s is important to determine whether they meet stakeholder interests and gauge project outcomes. In particular, public agencies need systems to track P3 outcomes because a systematic approach can inform them about a project and its results. For example, public agencies should evaluate their procurement processes by metrics such as durations, meeting milestones, market interest, and evaluation criteria. Further, they should monitor project outcomes such as service quality and project impacts. Public agencies can potentially engage third parties to monitor the criteria and standards set forth in the operations phase. Such comprehensive assessments would support determining whether P3s serve the broad constituents of these projects.

5.2 Research Contributions

My dissertation is focused on assessing stakeholder interests in P3s throughout their lifecycles as a means to gauge P3 performance. The inclusion of various stakeholders such as the State, Investors, Producers and Users/Citizens and their involvement in P3 development makes the task of assessment more complex because individual stakeholders have different interests, and these interests vary as the project progresses. Accordingly, my research has made three key contributions that improve the assessment of stakeholder interests and P3 outcomes.

5.2.1 Development of CSF-KPI Framework

Assessing P3 performance is an area of increasing interest among researchers and practitioners. Many studies focused on CSFs and a growing number of papers examining KPIs have emerged over roughly the last two decades. Extant literature has identified CSFs (Li et al. 2005; Mladenovic et al. 2013; Osei-Kyei and Chan 2015; Osei-Kyei and Chan 2018), categorized CSFs (Almarri and Boussabaine 2017a; Liu et al. 2015e; Ng et al. 2012a), and linked these to P3 project outcomes and performance. A systematic literature review brought some additional order to the CSF and KPI literature that is largely segmented and fragmented.

The study mapped the CSF and KPI literature and clearly established the distinction between CSFs and KPIs in terms of definition and characterization. Based on their frequency in

selected papers, this research identified 23 CSFs and 16 KPIs. The CSFs were grouped in six categories: (1) project environment, (2) economic and market conditions, (3) public sector capacity, (4) effective procurement, (5) project outcomes, and (6) lifecycle perspectives. Similarly, KPIs were divided into four categories: (1) project delivery KPIs, (2) financial KPIs, (3) operations KPIs and socio-economic KPIs. These categories supported aligning CSFs and KPIs with their application in the P3 projects. Based on the synthesis, a CSF-KPI framework was proposed that can support the assessment of P3 projects. The framework was organized from the life cycle perspective as defined by Liu et al. (2015): (1) project preparation (enabling environment, project shaping), (2) project procurement process (procurement and contract), and (3) project execution (implementation and service delivery).

Overall, this study brings together literature on CSFs and KPIs, so it expands prior work in this realm such as recent work by Osei-Kyei and Chan (2015). Further, the CSF-KPI framework provides guidelines for researchers and practitioners interested in the utilization of CSFs and KPIs throughout a P3 project's lifecycle.

5.2.2 Development of an Assessment Framework

P3s combine the expertise, capacity and interests of the private sectors, the regulatory capacity of the public sector and citizen and users' interests to develop public infrastructure. Therefore, P3 projects involve a range of stakeholders, from both public and private sectors at various stages of a project, which makes it even more difficult to determine their varying interests and expectations.

Many researchers have investigated what constitutes P3 success or how success can be determined and subsequently considered stakeholder perspectives. For instance, past research has: (1) examined public, private and lender risk perspectives and key metrics for their assessment (Grimsey and Lewis 2002); (2) proposed a P3 equilibrium framework to evaluate whether stakeholder interests are balanced (Garvin and Bosso 2008); (3) developed a governance framework accounting for perspectives of the public sector, the private sector and the civic sector (Jooste et al. 2009); and (4) proposed a conceptual model with five levels of P3 assessment (Hodge and Greve 2017). Despite the value of this prior work, these studies do not emphasize stakeholder interests over time, and some are only conceptual.

Adopting an alternative perspective of P3 performance, Liu et al. (2014) proposed a life-cycle CSF framework that derived and explained critical success factors that are vital to successfully implement P3s. The conceptual framework proposed 63 CSFs in three different phases: (1) initiation and planning, (2) procurement, and (3) partnership (construction, operation & maintenance). The basis of the conceptual model was the "Performance Prism" by Neely et al. (2001). However, the study did not address two major questions: (1) what are indicators of these CSFs? and (2) how can the CSF framework be operationalized with actual project?

Understanding the limitations of prior studies, the second study adopted a systematic approach to develop an assessment framework that identified: who are the key stakeholders, what are their interests, indicators of these interests and different levels of performance. A central element of the framework is the P3 stakeholder interests register which captures key stakeholder's interests in various phases of a project; each interest has associated indicators (56 in total) that are interpreted as "Fully met", "Partially met", or "Not met"; this register is depicted in Table 3-1. The key interests are grouped into 11 performance dimensions such as "project environment" and "revenue and operations"; these dimensions are then linked with three levels of performance: planning, project management and business. A fourth level – future potential – considers the project's impacts based on current trends. Overall, the assessment framework examines the stakeholder interests in P3 projects from a lifecycle perspective.

The framework is unique since it is holistic (capturing a project's life cycle) and comprehensive (links multiple stakeholder interests with indicators), and, most importantly, it can be operationalized. The key interests and their indicators were derived from the literature on P3 CSFs and KPIs. Moreover, the framework provides a transparent and replicable approach for assessing stakeholder interests. It establishes a baseline assessment of whether stakeholders' interests were met or not met in a P3 project. Finally, the framework was applied to an actual project; the I-495 Capital Beltway Express P3 to demonstrate its applicability and to draw preliminary conclusions about this P3.

5.2.3 Case Study of Four P3 Highway Projects

Given the growing momentum for P3s, it is vital to review the performance of P3 highway projects to see whether they succeed in serving stakeholders objectives. The case study

conducted evaluated four P3 highway projects in the US market using the developed assessment framework.

Several studies have examined multiple facets of P3s over the last two decades. For instance, Daito et al. (2013) considered implementation of I-495, Wang and Zhao (2018) evaluated the financial arrangements and risk allocation of nine P3 highway projects of Virginia; and Garvin (2019) emphasized the causes and aftermath of financial distress of four P3 projects. These studies are indicative of the focused assessments of P3s found in the literature; very few studies have examined P3s comprehensively.

Hodge and Greve (2017) explained the need to better understand the potential causal factors behind P3 project performance. Further, they indicated that the P3 community knows "very little about the performance of [long-term infrastructure contract] P3s – even at the most elementary levels". Consequently, the case study of the four P3 highway projects responds to the need to advance understanding of P3 outcomes. Beyond this, the case study provided a comprehensive assessment of stakeholder interests that supports evaluation of different performance dimensions and levels of performance, which enabled comparisons between projects. It expands the scope of prior studies as mentioned earlier. Further, its lifecycle perspective indicates how interests and actions within and between project phases impact one another.

5.3 Implications for Practice

The research conducted also has several implications for practice.

5.3.1 Pursuit of a Project or Involvement in an Established Process

The case study illustrates the challenges of pursuing a project over becoming involved in a process. For example, LBJ Expressway followed a typical two-step procurement process, so the Cintra-Ferrovial team had a reasonable understanding of how this process would proceed. The same cannot be said for the unsolicited or market lead proposals examined. For instance, when Fluor submitted its conceptual proposal for the I-495 managed lanes, it worked with VDOT for over five years to reach financial close; this collaboration was essential to the outcomes observed, but it was a lengthy one. Similarly, CTV proposed SR 125 and was awarded a franchise; subsequently, many unprecedented events happened, which substantially delayed the

start of construction. Hence all stakeholders, especially state DOTs and project developers must recognize the potential uncertainties involved when proposing a project for development versus responding to a conventional RFP.

5.3.2 Consider Revenue Risks Carefully

All the four projects in these studies are revenue risk projects. The primary revenue source in a revenue-risk project is tolls, which are paid directly to the concessionaire, who is solely dependent on the demand for the toll road. Intuitively the demand is expected to be relatively inelastic. Other critical factors such as nearby free alternatives, ability of toll rate adjustments, most importantly assessment of traffic demand and asset itself. Therefore, revenue risk , in many instances, is beyond concessionaires' control and thus it should be carefully evaluated before considering revenue risk for the concessionaires. For instance, in the case of SR 125 and SH 130, traffic levels significantly lower than that forecast for the project subsequently lead to bankruptcy.

5.3.3 Effective Project Delivery

The industry capacity to develop P3s is evident from the case studies. In the four cases, all the producers demonstrated their abilities to deliver projects on time and on schedule except SR 125, where the reason for delay was contractual clarifications. Still, utilization of quality assurance systems and KPIs in the project delivery are necessary.

5.3.4 Transaction Period

Long transaction periods add uncertainty and increasing transaction costs through the procurement process. In the two cases I 495 and LBJ expressway the transaction period is relatively long: 5.4 years and 5 years, respectively. In the case of SR 125, technically the financial close of the project had reached after 7 years of franchise award. It is evident that lengthy transaction periods not only increase the cost and risks for investors and producers but also can increase government costs. For instance, the cost of SR 125 rose to $344M to $670M partly due to the long transaction period. In addition, cost overruns and delays reduce the private sector's potential return on investment (ROI), and contract arrangements may penalize the private sector for not managing correctly.

5.3.5 Public and Private Sector Complementarity

The case study reveals support between public and private parties. In case of I 495, Flour came up with 4-2-2-4 configuration along with HOT lane which improved on VDOT's plan while in LBJ Expressway Cintra-Ferrovial provided an innovative technical solution after considering TxDOT's baseline design. In both these projects, the private sector provided the public sector with improved technical solutions to overcome specific challenges and constraints. Going forward, the public sector can learn from these examples and can replicate solution in their development if they consider self-finance.

5.3.6 Reduction of Toll Rates

The case studies demonstrate that toll rates play an influential role in P3 projects. Insufficient toll revenue led the concessioner of SH 130 and SR 125 unable to repay all the debt and to realize a return on investment. After emerging from bankruptcy, the new owners of SR 125 and SH 130 both reduced their toll rates approximately 40% from the previous owner to increase ridership. The new owners' benefit, however, from having a reduced cost structure. So, this raises questions about toll structures within P3s, particularly when market-based rates are not an option.

5.4 Future Research

This dissertation is the first step towards assessing P3 performance from the perspective of multiple stakeholders. A few avenues of future research are envisioned: (1) creating stakeholder assessment framework 2.0 and (2) assessment of solicited and unsolicited proposals.

5.4.1 Stakeholder Assessment Framework 2.0

This future research builds from insights gained from the overall research effort. The stakeholder interests register developed is comprehensive, but it is data intensive. It is also complex since 11 performance dimensions are also linked with the key interests. Future research can examine simplifying the approach. For instance, key interests or factors associated with the 11 performance dimensions are likely sufficient to evaluate P3s. This could reduce the data reduce the elements considered significantly. Further, a weakness of the current research was limited data related to citizen/user interests. New methods or indicators of their interests should be explored.

5.4.2 Assessment of solicited and unsolicited proposals.

Future research can be conducted to assess outcomes of solicited and unsolicited proposals. The case evidence collected here illustrates that both approaches can work to the benefit of stakeholders, but additional inquiry is required to further explore what are the benefits and pitfalls of both procurement routes, what factors and drivers will impact outcomes and what policies and processes should be followed.

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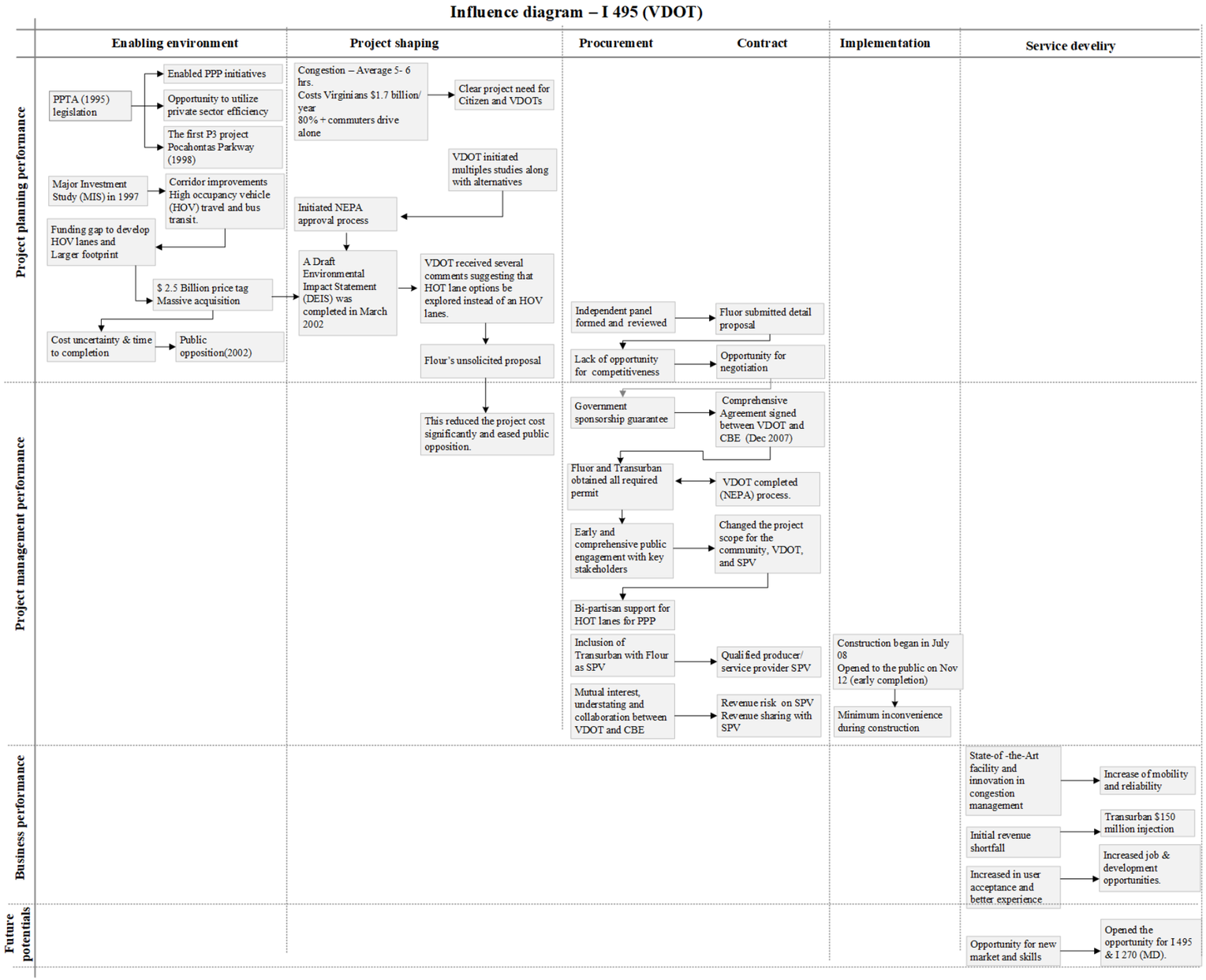
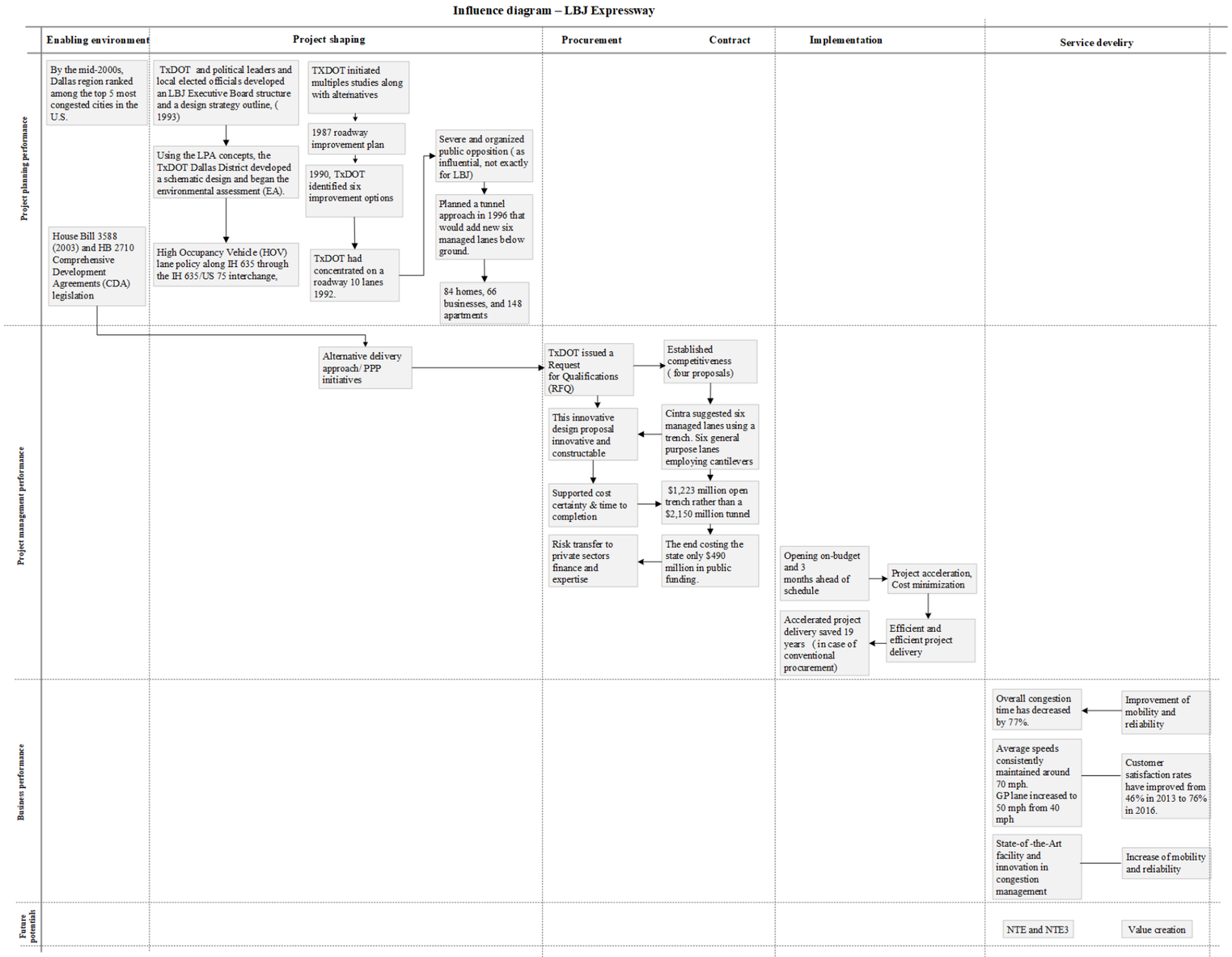
Appendix A : Influence Diagrams

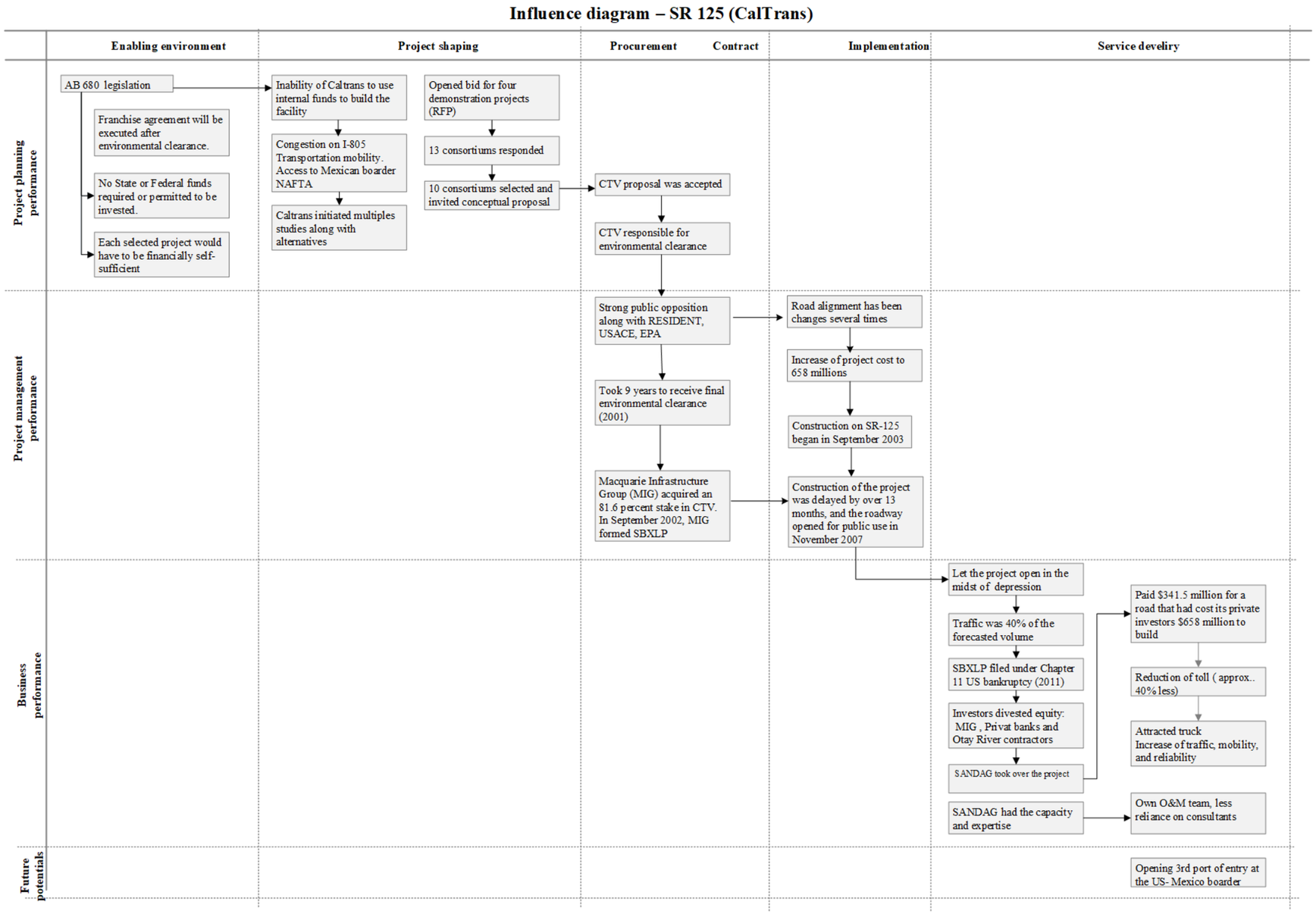
A.1 I-495 Capital Beltway



A.2 LBJ Expressway

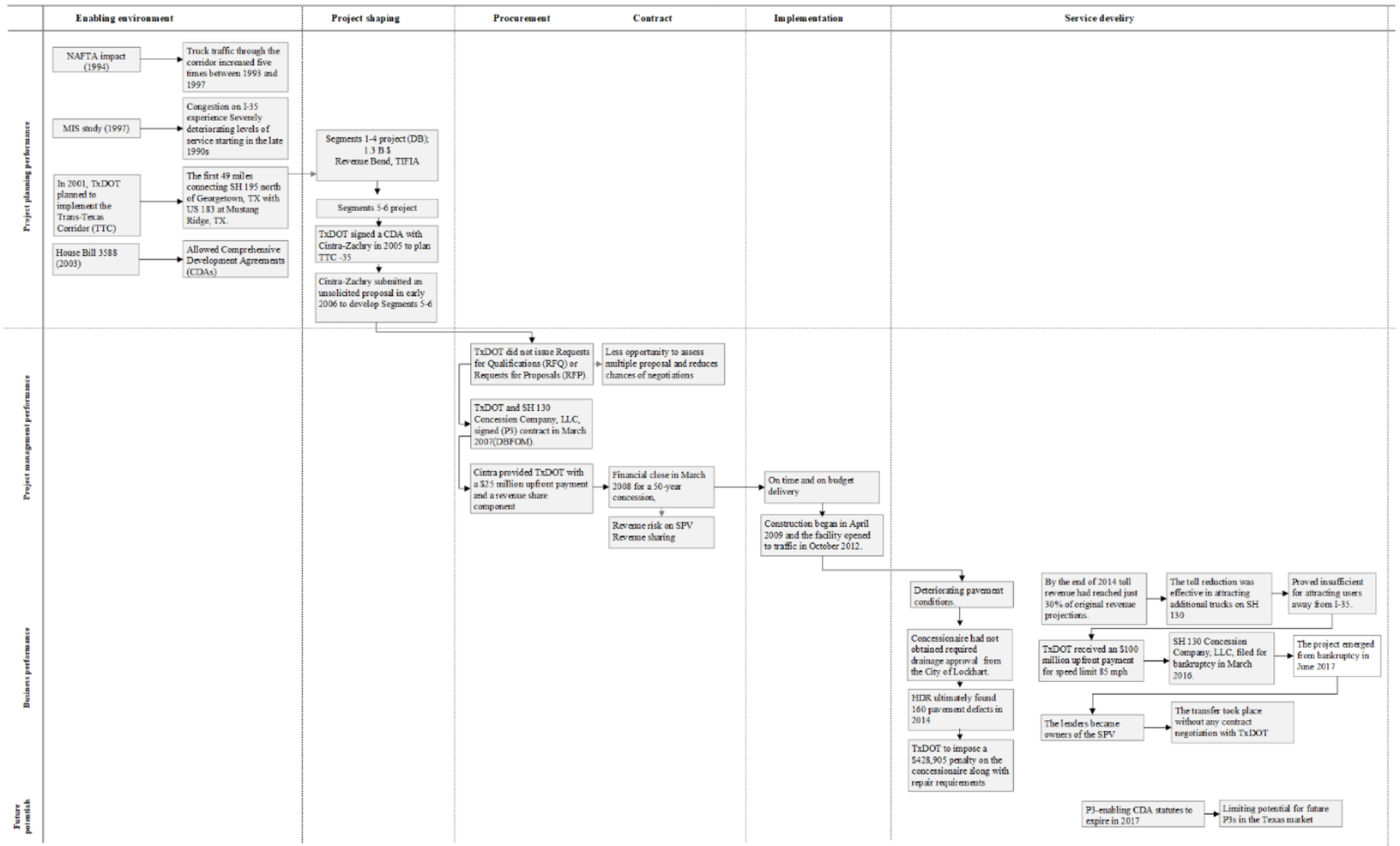


A.3 SR 125


Influence diagram – SR 125 (CalTrans)
Enabling environment
Project shaping
Procurement
Contract
Implementation
Service deveiry
Project planning performance
Project management performance
Business performance
Future potentials
AB 680 legislation
Franchise agreement will be executed after environmental clearance.
No State or Federal funds required or permitted to be invested.
Each selected project would have to be financially self-sufficient
Inability of Caltrans to use internal funds to build the facility
Congestion on I-805 Transportation mobility. Access to Mexican boarder NAFTA
Caltrans initiated multiples studies along with alternatives
Opened bid for four demonstration projects (RFP)
13 consortiums responded
10 consortiums selected and invited conceptual proposal
CTV proposal was accepted
CTV responsible for environmental clearance
Strong public opposition along with RESIDENT, USACE, EPA
Took 9 years to receive final environmental clearance (2001)
Macquarie Infrastructure Group (MIG) acquired an 81.6 percent stake in CTV. In September 2002, MIG formed SBXLP
Road alignment has been changes several times
Increase of project cost to 658 millions
Construction on SR-125 began in September 2003
Construction of the project was delayed by over 13 months, and the roadway opened for public use in November 2007
Let the project open in the midst of depression
Traffic was 40% of the forecasted volume
SBXLP filed under Chapter 11 US bankruptcy (2011)
Investors divested equity: MIG , Privat banks and Otay River contractors
SANDAG took over the project
SANDAG had the capacity and expertise
Paid $341.5 million for a road that had cost its private investors $658 million to build
Reduction of toll (approx.. 40% less)
Attracted truck
Increase of traffic, mobility, and reliability
Own O&M team, less reliance on consultants
Opening 3rd port of entry at the US- Mexico boarder

A.4 SH 130 (5&6)

Influence diagram – SH 130 (TxDOT)



Appendix B : Stakeholders Interests Register

B.1 I-495 Capital Beltway

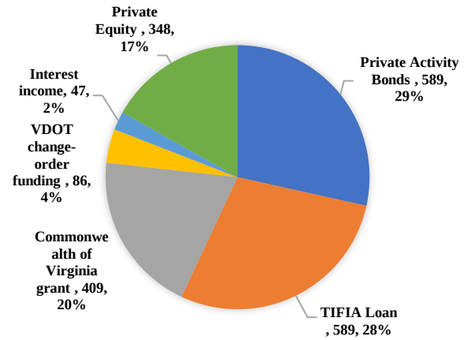
Stages/Phases	Stakeholder	Key interest and Expectations	Performance Indicators	Observations	Interpretation of Interests Met	Indicator	Performance Dimensions	Sources for Observations
Enabling Environment	State	Enabling legislation supports P3 project delivery	• Types and number of projects authorized. • Solicited and unsolicited proposals permitted. • Funding sources authorized	PPTA legislation was passed in 1995. • Roads and highways are eligible for P3s • Authorizes VDOT to receive solicited and unsolicited proposals In case of unsolicited proposals, allows to provide notice and extend an opportunity to accept competing proposals. • Allows the combination of public and private funds for project development	• Broad – Fully Met • Enabling legislations has no restrictions on developing transportation projects as P3s. The main legislation was passed in 1995, and it has been amended subsequently to modify and clarify provisions.	↑	**Project Environment**	• (PPTA 2001) • (Garvin 2019) • (PPP Contract Managment 2007)
	Investor & Producer	Socio-political stability that limits risks	Legislative or executive oversight process defined	• PPTA proposals evaluated following a multi-phase (4 phase) process as outlined in its implementation guidelines: ○ Phase One: Initial Review Committee ○ Phase Two: The Commonwealth Transportation Board Approval ○ Phase Three: Public-Private Transportation Advisory Panel Recommendation ○ Phase Four: The Commonwealth Transportation Commissioner's Selection • Legislative oversight is defined, and oversight process are inclusive for all type of stakeholders	• Guidelines published – Fully Met • Multi-step evaluation process is detailed in VDOT Implementation Guidelines, published following enactment of PPTA; Guidelines are updated periodically. • This phased approach demonstrates strong coordination and project appraisal process.	↑		• (PPTA 2001; The Commonwealth of Virginia 2005) • (Gifford and Transue 2015) • (Trip Pollard 2012)
			Legislation or executive guidelines define any stakeholder engagement requirements	• Implementation guidelines required copies of conceptual and detailed proposals to be provided to affected local jurisdictions for written comment within 60 days of receipt of proposal.	• Non-NEPA engagements defined – Fully Met • Implementation guidelines require written comments from affected local jurisdictions that proposers will be expected to address	↑		• (PPTA 2001; The Commonwealth of Virginia 2005) • (Brown et al. 2007) • (Denise V. Cheney 2018)
			Limited opportunity for "last minute" modification or termination of a project by legislative action	• Multi-phase evaluation process does not include any legislative approvals; once CTB and Advisory Panel recommendations are made/approved, then VDOT can proceed to negotiate a comprehensive agreement.	• No legislative approval required – Fully Met • Evaluation and approval is delegated to executive agencies; no legislative approvals required	↑		• Reference to 2001 and 2005 Impl Guidelines • (Gifford and Transue 2015)
		Favorable investment environment	Record of transactions and private investment in transportation projects • Number of prior P3 projects • Private equity and debt in prior projects	• 01 • Route 895 (Pocahontas Parkway) developed under PPTA • Structured as 63-20 Corporation and issued tax-exempt toll revenue bonds - $354 million • SIB loan - $18 million • Federal funds for design costs - $9 million	• One prior project under PPTA – Partially Met • Route 895 did not have private equity investment typical of P3 arrangements but did establish 63-20 entity to issue bonds secured by project itself.	↔		• (William G 2007) • (Virginia Department of Transportation (VDOT) 2005) • (FWHA 2006)
			Creditworthiness of owner	• In order to ensure access to low-interest debt, Virginia had established the Debt Capacity Advisory Committee (DCAC) in 1991 to maintain the Commonwealth´s AAA credit rating.	• AAA credit rating – Fully Met • VDOT maintained high credit rating to meet financial obligations having a ceiling of 5% of state revenues; this	↑		• (Commonwealth of Virginia 2017) • (Debt Capacity Advisory Committee 2012)

Stages/Phases	Stakeholder	Key interest and Expectations	Performance Indicators	Observations	Interpretation of Interests Met	Indicator	Performance Dimensions	Sources for Observations
				• DCAC's model employs a non-binding debt-service ceiling equaling 5% of state revenues.	favors agency's ability to meet any financial obligations to P3 projects			
			Types of governmental instruments or programs available to support private investment	• TIFIA program available; TIFIA legislation enacted in 1998 SAFETEA-LU (Section 11143) passed in 2005 included provisions allowing tax-exempt Private Activity Bonds (PABs) for up to $15 billion in selected highway and freight projects developed and operated by private parties .	• TIFIA and PABs available – Fully Met • Investor has the opportunity to utilize governmental instruments such as TIFIA and PABs to support private investment.	↑		• (FWHA 2006) • ("Build America Bureau" 2021)
	User/ Citizen	Checks & balances in development process	Process for accepting/approving projects as P3 is defined and historically followed	• Multi-phase evaluation process published in Implementation Guidelines. • limited track record at this juncture	• Process published – Fully Met • Process for accepting/approving projects as P3s is defined and followed	↑		• Reference to VDOT Implementation Guidelines of 2001 • (Brown et al. 2007) • (Denise V. Cheney 2018)
			Mandated opportunities for citizen/community input and engagement	• Affected local jurisdictions had 60 days to provide written comments; process outlined requires proposers to address written comments received.	A single mandated opportunity for written comments – Partially Met	↔		• Reference to VDOT Implementation Guidelines of 2001
Project shaping	State	Clear need for project	Project in long term transportation plan	• Major Investment Study (MIS) in 1997 by VDOT, • Proposed improvements may include high occupancy vehicle (HOV) travel and bus transit.	Yes: project in the long-term plan to improve the congestion in the corridor.- Fully met	↑	**Identification of Need**	• (Brown et al. 2007)
			Project in published pipeline	No; VDOT had not adopted this practice at this time	I-495 project was not in a published pipeline by VDOT.- Not Met	↓		
			Transportation conditions • LOS/congestion • Safety • Etc.	• Congestion – Average 5- 6 hrs. • Costs Virginians $1.7 billion annually in delays and wasted fuel. • More than 80 percent of area commuters drive to work alone. • Travel will increase 50% by 2025	Conditions warranted consideration of improvements to address congestion and trip times- Fully Met	↑		• (Virginia Dept of Transportaion 2015) • Transurban websites
		Due diligence to determine P3 suitability	P3 value drivers considered: • Risk transfer • Accelerated delivery • Private efficiencies	• Estimated cost of 4-4-4-4 configuration planned by VDOT was $2.5 billion. • VDOT would likely need to wait another 20+ years to develop I-495 improvements if self-financed	Qualitative factors not explicitly considered before submission of unsolicited proposal.- Not Met	↓	**P3 Determination**	• (Bolaños et al. 2017; Daito et al. 2013)
			Planning/feasibility studies	• EIS started in 1995, MIS in 1997 with DEIS published in 2002 • CBA study was included in NEPA documents.	VDOT had planned and performed feasibility studies, which had arrived at the 4-4-4-4 configuration and a $2.5 billion price tag. This opened the door for the Fluor proposal. – Fully Met	↑		• (Department of Transportaion Commonwealth of Virginia 2006)
			T&R studies	• Estimated avg. peak-hour volume on HOV/HOT 3,200/hours and base line. Fluor and Transurban had "investment grade" T&R study completed by Stantec and Vollmer in February 2007	Fluor and/or Transurban completed T&R studies throughout shaping phase – Fully Met	↑		• Fluor proposal (2002)
			Business Case and/or VfM analysis	• No VfM studies.	No specific ex ante study i.e., VFM was not observed.- Not Met	↓		• (Department of Transportaion Commonwealth of Virginia 2006).
		Stakeholder Management	Stakeholder engagement strategy • Non-mandatory engagement	Public hearings held in May 2002 as part of NEPA approval process leading to DSIS.	Stakeholder engagement observed- Fully Met	↑	**Stakeholder Management**	• (Bolaños et al. 2017)

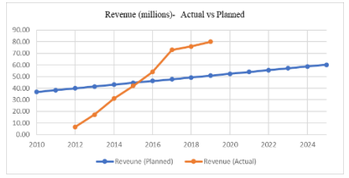
Stages/Phases	Stakeholder	Key interest and Expectations	Performance Indicators	Observations	Interpretation of Interests Met	Indicator	Performance Dimensions	Sources for Observations
			• Citizen advisory committees, etc.					
	Investor	Government commitment	Industry forums held and types of public contributions/enhancements.	• No industry forums held • VDOT had published Implementation Guidelines as required by PPTA	• No industry forums held- Partially Met	↔	**Public Agency Capacity**	
		Experienced/reliable agency	Dedicated unit for alt. delivery or P3	• No dedicated office but VDOT had "Alternative Project Delivery Division" within state •	VDOT experience was "developing"; with P3s, were pioneering such efforts at the time- Partially Met	↔		
			Type and years of experience	• PPTA projects at time limited to development of Route 895 (Pocahontas Parkway) and then its lease to Transurban in 2006		↔		• (FWHA 2006)

		Project is attractive	Revenue potential
			• Tolling: common in region or not
			• Project characteristics:
			  ▪ Standalone vs. urban network
			  ▪ Extension/expansion vs. greenfield
			  ▪ Highly congested vs. limited congestion
			  ▪ Few competing routes vs. many alternatives
			• Users: high-income, time sensitive vs. average/lower income
				• Tolls are not common in the area
				• Urban setting
				• Extension/expansion
				• Highly congested
				• Few alternatives in region
				• Corridor part of large network
				• User : High income , time sensitive
					Capital Beltway integrates with major highways (I 270 and I 95) and serve as nexus to the day-to-day traffic of the Washington, DC, metropolitan region. - Fully Met	↑	**P3 Determination**	• (PPP Contract Management Report 2012)

		Statutory clearances	ROW acquisition	• Draft environmental Impact statement published March 2002, • Final Environmental Impact Statement published March 2007; VDOT completed NEPA process at this time • Fluor and Transurban obtained all required permits prior to construction	The processes were fully compliant with FWHA and NEPA regulations. Complaint – Fully Met	↑		• (Department of Transportaion Commonwealth of Virginia 2006) • (FWHA 2006)
			NEPA progress					
	Investor & User/Citizen	Stakeholder engagement	Types and number of public meetings	• Public hearing held as part of NEPA approval. • Community engagement, public meetings, • Indicative of willingness of VDOT and concessionaire to accept input	Early and comprehensive public engagement with key stakeholders was done during the preconstruction stages. – Fully Met	↑	**Stakeholder Management**	• (Global Infrastructure Hub 2014) • http://www.p3virginia.org/projects/i-495-express-lanes/ • (AECOM 2007a)
			Forms of communication/engagement		Various modes of public engagement were utilized – Fully Met	↑		
	Producer	Scope of work offers degrees of freedom	Design flexibility exists/remains (i.e. design not advanced beyond 30%)	• VDOT worked with Flour collaboratively to develop a technical solution. • Four general-purpose lanes and two HOT lanes in each direction, i.e., a 4-2-2-4 configuration instead of original 4-4-4-4	The changes/configuration required only seven houses to be demolished compared to the original 350.	↑	**P3 Determination**	• (PPP Contract Management Report 2012) • (Bolaños et al. 2017)
		Baseline site conditions	Potential for unforeseen conditions	• The fluor proposal is different from that of VDOT's prior plan. HOT lane will be built on the median.	Presumably, developer had investigated the geotech report by themselves- Fully Met	↑		• (Daito et al. 2013)

Stages/Phases	Stakeholder	Key interest and Expectations	Performance Indicators	Observations	Interpretation of Interests Met	Indicator	Performance Dimensions	Sources for Observations
Procurement	State	Best value evaluation process	Evaluation process and criteria	• Non-competitive: unsolicited proposal • When no competing conceptual proposals received within 45 days, VDOT asked Fluor to present a detailed proposal. PPTA process followed	Non – competitive- Not Met	↓	**Procurement Process**	(Garvin 2019)
		Market interest	Number short-listed teams	• 0, unsolicited proposal by Fluor	Only one by Fluor – Not met	↓		
			Number of proposals received	01	Only one by Fluor – Not met	↓		
		Minimize financial commitments or exposure	• Amount and type of public contributions • Financial structure • Debt/Equity ratio	 • Payment to concessionaire if HOV threshold is exceeded. • VDOT contributes $409 million subsidy. • VDOT is not responsible for any debt repayment for the life of the project. • Structure helps VDOT stay within state debt limits.	• Balanced for State- Partially Met • Commonwealth of Virginia grant - $409 M • VDOT change-order funding - $86 M • In I 495 the higher public subsidies (20%+) increase the exposure of the state/agency. • The project should not greatly impact state debt limits.	↔		• (FWHA 2006)
	Investor	Reliable and fair process	Procurement and contracting guidelines in place	• As per PPTA process, criteria were followed. • Fluor was aware of the Implementation Guidelines of PPTA at that time.	Guideline published – Fully Met	↑		• PPTA (2001)
			State limits number of competitors through shortlisting process	• One unsolicited proposal.	Supported the investor for the securing the project.- Fully Met	↑		• (Global Infrastructure Hub 2014)
			Time from notice to commercial close & commercial to financial close	• Flour submission August 2002 • Financial close Dec 2007 • Construction began in spring 2008	5 years and 4 months from submission of unsolicited proposal to financial close – Long period- Not Met	↓		• (AECOM 2007a)
	Producer	Potential to modify scope of work to add value/reduce cost	ATC/AFC process -OR- • Potential to negotiate adjustments of scope	• VDOT, Fluor and Transurban (CBE) worked for 5 years to develop design and negotiated scope of work. • The Express Lanes planned to commuter bus services, high occupancy vehicles (HOV-3), and other vehicles with electronic transponders	• Strong collaboration- Fully Met. • Different design provision was provided by Fluor to reduce the footprint and lane configuration. • Design and negotiation period is long and expensive. • Higher transaction cost.	↑		• (Minnesota Department of Transportation 2009) • Innovative Finance in Action Virginia I-495 HOT Lanes (October 2009) • (Office of Public-Private Partnerships 2019)

<table>
<tr><th>Stages/Phases</th><th>Stakeholder</th><th>Key interest and Expectations</th><th>Performance Indicators</th><th>Observations</th><th>Interpretation of Interests Met</th><th>Indicator</th><th>Performance Dimensions</th><th>Sources for Observations</th></tr>
<tr><td rowspan="4"></td><td rowspan="4">User</td><td rowspan="4">Transparent and legitimate process</td><td>Followed relevant procurement laws/regulations</td><td>• VDOT followed PPTA Act and Implementation Guidelines.</td><td>As per PPTA – Fully Met</td><td>↑</td><td rowspan="4"></td><td>• (PPTA 2001; The Commonwealth of Virginia 2005)</td></tr>
<tr><td>Progress and outcomes communicated</td><td>• Yes, as per legislative provision VDOT updated to public about development</td><td>As per PPTA – Fully Met</td><td>↑</td><td rowspan="3">• (Office of Public-Private Partnerships 2019)</td></tr>
<tr><td>Procurement documents publicly available</td><td>• Yes, ARCA and exhibits posted (A- U)</td><td>Published- Full Met</td><td>↑</td></tr>
<tr><td>Rationale for selecting preferred known</td><td>• Advisory Panel outlined support and concerns in recommendation to proceed with negotiations in letter to VDOT Commissioner on 6/28/2004</td><td></td><td>↓</td></tr>
<tr><td>Contract</td><td>S, I, P</td><td>Equitable allocation of risk</td><td>Risk profile</td><td><table><tr><th>Risk(s)</th><th>Public</th><th>Private</th><th>Shared</th></tr><tr><td>Design</td><td></td><td>√</td><td></td></tr><tr><td>Permit</td><td></td><td></td><td>√</td></tr><tr><td>Financing</td><td></td><td>√</td><td></td></tr><tr><td>Right of way</td><td></td><td>√</td><td></td></tr><tr><td>Environmental permit</td><td></td><td></td><td>√</td></tr><tr><td>Operating expenses and Maintenance</td><td></td><td>√</td><td></td></tr><tr><td>performance</td><td></td><td>√</td><td></td></tr></table></td><td>Indicates as P3 practices</td><td>↔</td><td rowspan="2">Risk Management</td><td>• (Nguyen et al. 2018a)</td></tr>
<tr><td>State/User</td><td>Protecting public interest</td><td>Aspects considered:
• Revenue sharing
• Limits on financial commitments by state
• Concession period</td><td>• Toll revenue will be shared on the various base case scenarios with VDOT
• The concession contract agreement emphasized supportive clauses on performance, safety and service standards.</td><td>• Aspects considered – Partially Met
• Revenue risk to SPV
• Revenue sharing with VDOT
• Very long concession period.- 80 years</td><td>↔</td><td>• (Build America Bureau 2014)</td></tr>
<tr><td rowspan="3">Implementation</td><td>State</td><td>Specified asset delivered</td><td>Opens on time and conforms to agreed scope</td><td>• Project opened on time and with budget.
• State of the Art toll collection system
• First HOT lane project in the USA
• The project will also involve the replacement of more than 50 bridges and overpasses.
• Flour -Lane was DB contractors.</td><td>• Eased Beltway congestion and reduce “cut-through” traffic on local roadways and surrounding regions/ streets.- Fully Met</td><td>↑</td><td rowspan="3">Project Delivery</td><td>• (Daito et al. 2013)
• (William G 2007)</td></tr>
<tr><td>Investor</td><td>On time and on budget</td><td>Cost and schedule overruns</td><td>No cost and schedule overruns</td><td>Within time and budget – Fully Met</td><td>↑</td><td>• (Lane Construction 2014)</td></tr>
<tr><td>Producer</td><td>Effective and efficient delivery</td><td>Meets SPV milestones</td><td>Opened 2 months ahead of deadline. Delivered within budget.</td><td>SPV milestone achieved – Fully Met</td><td>↑</td><td>• (Perez et al. 2016; Population Council 2017; Public Works finance 2015)</td></tr>
</table>

Stages/Phases	Stakeholder	Key interest and Expectations	Performance Indicators	Observations	Interpretation of Interests Met	Indicator	Performance Dimensions	Sources for Observations
			Number of claims or disputes	A change order was issued by VDOT ($125 M) with no extension of time	Managed within the schedule- Fully Met	↑		• (PPP Contract Management Report 2012)
			No major accidents during construction	Safety performance maintained in the I-495 express lanes. • Achieved 5 million safe work hours without any major incident through the construction period 2012.	Nor reported- Fully Met	↑		• (Lane Construction 2014)
	User	Minimal inconveniences and environmental impacts	Major incidents during construction	Delivered more than 30,000 construction notices.	Minimize inconvenience – Fully Met	↑		• ("I-95/495 (Capital Beltway) - HOT Lane construction" 2010)
			Complaints from citizens/businesses	No major complaint from citizen or business	Fully Met	↑		
Service delivery	State	Service meets or exceeds expectations	Service indicators (dependent on type and purpose of project)	• Increase of speed limit from 55 mph to 65 mph (June 24, 2013) • A 17-minute average time saving during peak periods, compared to the GP lanes. • An increase of 8-15% in the use of HOV (toll-exempt trips). • Post congestion index is not available	Speed and mobility enhanced - Fully Met	↑	**Service Quality**	• (Transurban 2017)
			Penalties or sanctions/bonuses	A 33-minute average incident clearing time.	No penalty ort sanction imposed - Fully Met	↑		• (Transurban 2017)
	Investor	Return on investment	Actual Traffic & Revenue	During ramp up period (2012-2015) • Due to low traffic flow, the private developer has lost over $300 million since the road's opening in November 2012 • Average volume of traffic for three months ending June 2013 was 35,000 vehicles – 40% of original projections. • During the first six weeks of operation Transurban estimated that the new Express Lanes lost US$11.3 million due to less-than-expected traffic volume. Post ramp up – 2016 • Meeting or exceeding expected traffic revenue from 2016 onward	Positive trend in revenue – Fully Met 	↑	**Revenue & Operations**	• (Transurban 2017, 2018; Virginia Dept of Transportaion 2015) • (Daito et al. 2013) • (Virginia Dept of Transportaion 2015)
			Equity invested or divested	• In order for Transurban to stabilize its debt and finances, the project needed an additional $280 million of equity and a $150 million reserve.	Presumably, revenue in the ramp up period trigger the condition- Not Met	↓		• (Jenn Wiggins ;Will Willitts 2014)
	Producer	Asset performance/Operation effectiveness	Compliance with standards	No sanctions observed.	Complaint and No section – Fully Met	↑		• (FWHA 2006)
			Change in oversight by the State	• No increased oversight	No increased oversight observed- Fully met	↑		
	User	Adds expected value	User patronage and satisfaction	• 75% customer satisfaction in drivers´ satisfaction surveys. • Usage increasing and average toll rate going up (greater willingness to pay) • Satisfaction is also evident for users -only 3% of all Express Lanes trips go unpaid.	Meeting user interest in using and satisfaction – Fully Met	↑	**Service Quality**	• (Transurban 2017) • (Bolaños et al. 2017)

Stages/Phases	Stakeholder	Key interest and Expectations	Performance Indicators	Observations	Interpretation of Interests Met	Indicator	Performance Dimensions	Sources for Observations
			• Increase of job creation, • Increase of commercial development.	• 31,000 jobs were supported due to the project, while about US$3.5 billion in the economy was injected. • USD $490 million has been contracted to disadvantaged enterprise and small, women's and minority enterprises	VDOT and Transurban have reported the similar information.- Fully Met	↑	**Project Impact**	• (Build America Bureau 2014) • (Virginia Dept of Transportaion 2015) • (Chen et al. 2017)

B.2 LBJ Expressway

Setting/Phase	Stakeholder	Key interests	Performance indicators	Interpretation	LBJ expressway	Interest	Performance dimension	Sources for Observations
Enabling Environment	State	Enabling legislation supports P3 project delivery	• Types and number of projects authorized • Solicited and unsolicited proposals permitted • Funding sources authorized	• Consider NCSL Assessment • Broad: no restrictions on # or types of projects; solicited and unsolicited allowed; no or limited restrictions on use of public funds • Limited: restrictions on types and # of projects; unsolicited proposals are not authorized; restrictions on public funds	• Broad: – Fully met • Texas' 2003 House Bill 3588 authorized TxDOT to conduct transportation P3s using Comprehensive Development Agreements (CDA) – both solicited and unsolicited proposals • On May 29, 2005, Texas State Legislature passed HB 2702 which clarified certain provisions. • The development, financing, operation, and maintenance of a facility for a specific time period up to 52 years. • DBB/DB and transportation projects • Chapter 223 also mandates that CDAs, including concession agreements, must be arrived at through a competitive bidding process.	↑	**Project Environment**	• (TxDOT 2015a) • (TxDOT 2009) • (Canales 2020) • (Glover et al. 2016) • (AECOM 2007) p. 3-98 to 3-99

	Investor & Producer	Socio-political stability that limits risks	Legislative or executive oversight process defined	Process published and readily available	• Guidelines published. – Partially met
					• TxDOT followed a four phase evaluation process for CDAs but this process was not documented.
					  ▪ Toll viability study
					  ▪ Prequalification
					  ▪ Bid preparation and evaluation.
					  ▪ Contract finalization
						↔		• (O'Connor et al. 2005a)
								• (Cassidy et al. 2016)
								• (TxDOT 2015a)

			Legislation or executive guidelines define any stakeholder engagement requirements	Non-NEPA public engagement required by enabling legislation or agency guidelines	• Non-NEPA engagements defined.- Not met • TxDOT will review petition to ensure all requirements have been met before a public hearing date can be set. If the petition is not complete, it will be returned to the petitioner to address deficiencies. • TxDOT will hold one or more public hearings to receive comments on the petition. • TxDOT will post notice of public hearing in Texas Register. • County will advertise the hearing in accordance with a public outreach plan developed with TxDOT	↓		• (TxDOT 2007a) • (MacGregor 1997)
			Limited opportunity for "last minute" modification or termination of a project by legislative action	Multi-phase evaluation process does not include any legislative approvals; once CTB and Advisory Panel recommendations are made/approved, then VDOT can proceed to negotiate a comprehensive agreement.	• No legislative approval required – Fully Met	↑		• (AIAI 2007)

		Favorable investment environment	Record of transactions and private investment in transportation projects
			• Number of prior P3 projects
			• Private equity and debt in prior projects
				• Number of prior projects
				• Financial structure of prior projects
				  ○ Debt: equity ratio
				  ○ Inclusion of financial instruments like TIFIA or PABs
					• 02 projects- Partially met
					• SH 130 (5&6) in progress when RFP issued; financial close in 2007
					  Senior bank loans - $685.8 million
					  TIFIA loan - $430 million
					  Private equity - $209.8 million
					  Interest income - $2.3 million
					• NTE started during procurement; financial close in 2009
					  Private Activity Bond - $398 million
					  TIFIA Loan - $650 million
					  Public Funds - $594 million
					  Equity Contribution - $426 million
						↔		• (FWHA 2006)

Setting/Phase	Stakeholder	Key interests	Performance indicators	Interpretation	LBJ expressway	Interest	Performance dimension	Sources for Observations
			Creditworthiness/rating history of owner	• Fitch/Moody's/S&P Issuer Rating where higher indicative of agency/state capacity to meet financial obligations and lower the opposite.	• To ensure access to low-interest debt, "AAA" – Fully met	↑		• Interview data
			Types of governmental instruments or programs available to support private investment	In US: • TIFIA program • PABs authorized	• Both TIFIA and PABs available – Fully met • TIFIA program active • PABs authorized by SAFETEA-LU in 2005	↑		• (AIAI 2007)
	User/ Citizen	Checks & balances in development process	Process for accepting/approving projects as P3 is defined and followed	Process is published and readily available	• Process published – Fully met • Four phase evaluation process is published and readily available. • Toll viability study • Prequalification • Bid preparation and evaluation. • Contract finalization	↔		• (Glover et al. 2016)
			Mandated opportunities for citizen/community input and engagement	Enabling legislation or agency guidelines include mandated public engagement requirements	• Executive Board established – fully met • TxDOT and local leaders established LBJ Executive Board to coordinate public input for LBJ corridor improvements	↑		• (MacGregor 1997) • (USDOT 2009)
Project shaping	State	Clear need for project	Project in state's transportation plan	Yes: project in LT or ST plan indicative of need No: indicative that not a previously identified need	• Yes: Fully met • Yes: late 1980s, TxDOT decided to evaluate • options for tackling the increasing IH 635 congestion, • 1987, study contributed to a roadway improvement plan and 1988 TxDOT identified six improvement options, • 1992 Two additional traffic lanes (increasing the GP lanes to 10 from 8), 2 HOV lanes, and 4 elevated managed lanes proposed for LBJ expressway. • In 1996, TxDOT developed tunneling approach that would add six managed lanes underground.	↑	**Identification of Need**	• (MacGregor 1997)
			Project in published pipeline	Yes: illustrates need and signals to such to interested stakeholders No: not in pipeline or agency does not publish pipeline so not indicative of need or signaling	• No: practice not followed at time – Not met	↓		
			Current conditions • LOS/congestion • Safety • Etc.	Degrading or poor current conditions indicative of need: poor or declining levels of service, safety, etc.	• Current conditions degrading - Fully met • Alleviate existing congestion. • Accommodate future travel demand. • Improve safety. • By the mid-2000s, Dallas region ranked among the top 5 most congested cities. • Originally designed to carry 180,000 vehicles, IH 635 was carrying 270,000 vehicles by 2009,	↑		• (Bolaños et al. 2017)

Setting/Phase	Stakeholder	Key interests	Performance indicators	Interpretation	LBJ expressway	Interest	Performance dimension	Sources for Observations
					• Expected to reach 450,000 by 2020; 1,000,000 vehicles per day by 2030.			
		Due diligence to determine P3 suitability	P3 value drivers considered: • Risk transfer • Accelerated delivery • Private efficiencies	Qualitative factor(s) identified by public agency as rationale for P3	• Factors considered - Fully met • TxDOT expected P3 would accelerate project delivery and save 19 years of development time (compared to conventional procurement)	↑	**P3 Determination**	• (Jacobs 2010)
			Planning/feasibility studies	Types of studies completed and published indicate quality and depth of feasibility assessment	• Yes- Fully met • 1988, TxDOT identified six improvement options: transit access and expanding capacity from 8 to 18 • 1992 TxDOT had concentrated on a roadway 10 lanes (2 HOV, 4 elevated managed lane, • 1996 TxDOT settled on a tunnel approach that would add six managed lanes below ground. • CBA study has been observed.	↑		
			T&R studies	• Completed studies and source indicative of demand/revenue potential • Source indicative of potential for optimism bias	• Yes – Fully met • TxDOT and Lender performed T&R studies, surveys. • T&R studies supported managed lanes concept.	↑		• (Lynch 2010)
			Business Case and/or V*f*M analysis	Yes: Completed and published ex-ante and/or ex-post studies indicative of P3 suitability No: Ex-ante and/or ex-post studies not completed	• No VfM or business case studies - Not met • No evidence of VfM studies conducted; no ex-post study	↓		• (Gomez-Ibanez et al. 2018)
		Stakeholder Management	Stakeholder engagement strategy • Non-mandatory engagement • Citizen advisory committees, etc.	• Types of non-mandatory public engagements indicative of stakeholder involvement and input • Frequency of non-mandatory public engagement indicative of stakeholder involvement and input	• Participation – Fully met • LBJ Executive Board established to coordinate public input • During MIS study in 1993-1996, over 134 project meetings were held. These meetings led to four specific areas of concern for the LBJ project. • Once CDA initiated, TxDOT organized 4 (four) public hearings for the project (March 2007).	↑	**Stakeholder Management**	• (NCTCOG 2009)
	Investor	Government commitment	Industry forums held and types of public contributions/enhancements.	• Number and type of industry forums signal openness to industry input	• No forums but public contribution to project – partially met • No forums held • TxDOT arranged for contribution of public funds	↔	**Public Agency Capacity**	
		Experienced/reliable agency	Dedicated unit for alt. delivery or P3	Presence of dedicated office suggests public agency competency	• No dedicated office, but CDA Program units – partially met	↔		
			Type and years of experience	• Experienced: 3 or more executed prior projects • Developing: 1-2 executed prior projects • Inexperienced: 0 projects	• Developing – partially met • SH 130 (5& 6) progressing; financial close - March 2007 • NTE started during procurement; financial close – Dec 2009	↔		

Setting/Phase	Stakeholder	Key interests	Performance indicators	Interpretation	LBJ expressway	Interest	Performance dimension	Sources for Observations
		Project is attractive	Revenue potential • Tolling: common in region or not • Project characteristics: o Standalone vs. urban network o Extension/expansion vs. greenfield o Highly congested vs. limited congestion o Few competing routes vs. many alternatives • Users: high-income, time sensitive vs. average/lower income	• Tolling: common that facilities are tolled in region improves revenue potential • Project characteristics: revenue potential improved when facility is standalone and extension/expansion in highly congested corridor or region with few competing routes. • Users: revenue potential when users are of higher income and time sensitive.	• Good revenue potential - Fully met • Toll is common in the area • Urban setting • Extension/expansion • Highly congested • Few alternatives • Part of large network • User : High income, time sensitive	↑	**P3 Determination**	• (TxDOT 2015b)
		Statutory clearances	ROW acquisition	Progress or completion: • Signals public sector commitment • Reduces risk of termination or delay	• Complete- Fully met • TxDOT is responsible for ROW with the assistance of concessionaire. • TxDOT led the reevaluation with the private developer providing all supporting documentation and studies as required • Obtained NEPA environmental approval.	↑		• (de Ormijana and Rubio 2017) • (Saenz de Ormijana and Rubio 2017)
			NEPA progress			↑		
	Investor & Users/Citizen	Stakeholder engagement	Number of public meetings	Amount of opportunities for public input – more meetings increases likelihood that either support or opposition will surface	• TxDOT organized 4 (four) public hearings were held for the project (March 2007). Prior to CDA decision, extensive public input coordinated by LBJ Executive Committee	↑		• Interview data
			Types/forms of communication/engagement	Types/forms of engagement utilized – multiple means for input increases likelihood that either support or opposition will surface	• Regular periodic engagements – Fully met	↑		
	Producer	Scope of work offers degrees of freedom	Design flexibility exists/remains (i.e., design not advanced beyond 30%)	• Level of design completed – schematic or illustrative design levels provide opportunity for alternatives/technical enhancements	• Fully met • TxDOT had originally planned a substantial part of the project as an underground tunnel but was concerned with the construction cost associated with this concept. • Before submission of bid producer had the clear understanding about the scope and prior initiatives by the TxDOT (Interview)	↑		• (de Ormijana and Rubio 2017) • (Saenz de Ormijana and Rubio 2017)
		Baseline conditions understood	Potential for unforeseen conditions	Site conditions in existing corridor more likely known	• Existing corridor – fully met	↑		
Procurement	State	Best value evaluation process	Evaluation process and criteria	• Competitive vs. Non-Competitive • If competitive, procurement follows “best-value” principles/practices	• Competitive multi-stage process – fully met • Four concessionaires participated. • TxDOT awarded this CDA project to a Cintra-led Developer consortium, following a competitive RFP process. • Followed two-step competitive procurement process (RFQ followed by RFP) • The best value determination will be based on an 80-20-point scale. • Total Proposal Score = Price Score (max. 80 points) + Technical Score (max. 20 points)	↑		• (TxDOT 2007b)

Setting/Phase	Stakeholder	Key interests	Performance indicators	Interpretation	LBJ expressway	Interest	Performance dimension	Sources for Observations
					• Price Score (maximum of 80 points) = Base Price Score (maximum of 76 • points) + Capacity Improvement Price Score (maximum of 4 points) • Technical Score = Evaluation Score * 0.20		**Procurement Process**	
		Market interest	Number of short-listed teams	Higher number improves competitive potential	• Competitive- Fully met • 04	↑		
			Number of proposals received	Higher number improves likelihood of receipt of "best value"	• Partially met • 02	↔		
		Minimize financial commitments or exposure by the state	• Amount and type of public contributions • Financial structure • Debt/Equity ratio	• Limited public subsidies or guarantees decreases exposure • Debt: equity ratio – more equity, more private leverage and stake	• Public contribution provided- Partially met • $490 M - 18.5% public sector funds; however, concessionaire requested roughly half of public funds available • $850 M - 32.1% TIFIA loan • $682 M - equity • TxDOT is not responsible for any debt repayment for the life of the project. • TxDOT will maintain state debt limits.	↔		• (FWHA 2006)
	Investor	Reliable and fair process	Procurement and contracting guidelines in place	Defined procurement process improves predictability	• Fully met • General guidelines not in place • Procurement followed typical two-step process with RFQ issued, shortlisting, and then RFP with defined evaluation process and criteria	↑		• (TxDOT 2007b)
			State limits number of competitors through shortlisting process	3-4 shortlisted teams improve probability of award and return on business development funds"	• 4 short-listed teams – fully met	↑		
			Time from notice to commercial close & commercial to financial close	• Duration from notice to commercial close indicative of efficiency and effectiveness of procurement process • Duration from commercial to financial close indicative of quality of agreement	• > 4 years from RFQ to commercial; <12 to reach financial close: Partially met • May 23, 2005 – TxDOT issued request for qualifications. • November 22, 2005 – TxDOT short-listed four proposers. • October 26, 2006 – Authorization to issue RFP by TT Commission • September 18, 2007 – RFP Issued • September 4, 2009 – Commercial close; 4 years and 4 months from RFQ to commercial close • June 22, 2010 – Financial close	↔		• (Jacobs 2010) • (O'Connor et al. 2005a)
	Producer	Potential to modify scope of work to add value/reduce cost	ATC/AFC process included -OR- Potential to negotiate adjustments of scope	Inclusion of process in RFP provides opportunity to add value through technical/financial enhancements -OR- • Ability to negotiate scope provides opportunity to add value through technical/financial enhancements. • Probity safeguards public and private sectors	• Yes- Fully met • RFP included ATC process; industry review process, TxDOT decided to provide design flexibility in the proposals allowing bidders to opt between an underground tunnel or a cut and partial cover concept, as well as intermediate solutions between the two • In addition, TxDOT and preferred bidder negotiated elements to add value through technical/financial enhancements.	↑		
	User	Transparent and legitimate process	Followed relevant procurement laws/regulations	Complied with regulations	• Complaint – Fully met • TxDOT followed all the criteria as mentioned in the CDA.	↑		• (TxDOT 2009) • (TxDOT 2007b)
			Progress and outcomes communicated	Communicated progress and outcomes to public	• Yes, as per legislative provision TxDOT updated public about development. - Fully met	↑		

<table>
<tr><th>Setting/Phase</th><th>Stakeholder</th><th>Key interests</th><th>Performance indicators</th><th>Interpretation</th><th>LBJ expressway</th><th>Interest</th><th>Performance dimension</th><th>Sources for Observations</th></tr>
<tr><td rowspan="3">Contract</td><td rowspan="3"></td><td rowspan="3"></td><td></td><td></td><td>• May 7, 2009 – CDA Public hearing</td><td></td><td rowspan="3"></td><td rowspan="3"></td></tr>
<tr><td>Procurement documents publicly available</td><td>Made procurement documents readily available (i.e., posted to website)</td><td>• Yes- Fully met
• Most of the documents are publicly available</td><td>↑</td></tr>
<tr><td>Rationale for selecting preferred known</td><td>Agency identifies and communicates basis of selection</td><td>• Criteria for selection in RFP - Fully met
• The best value determination will be based on an 80-20-point scale.
• Total Proposal Score = Price Score (max. 80 points) + Technical Score (max. 20 points)
• Price Score (maximum of 80 points) = Base Price Score (maximum of 76
• points) + Capacity Improvement Price Score (maximum of 4 points)
• Technical Score = Evaluation Score * 0.20</td><td>↑</td></tr>
<tr><td rowspan="2">Contract</td><td>S, I, P</td><td>Equitable allocation of risk</td><td>Risk profile</td><td>Risks are apportioned in accordance with prevailing practices or precedents</td><td>• DBFOM (52 Years)
<table>
<tr><th>Risk(s)</th><th>Pu</th><th>Pr</th><th>Shared</th></tr>
<tr><td>Design</td><td></td><td>√</td><td></td></tr>
<tr><td>Permit</td><td></td><td></td><td>√</td></tr>
<tr><td>Financing</td><td></td><td>√</td><td></td></tr>
<tr><td>Right of way</td><td></td><td>√</td><td></td></tr>
<tr><td>Environmental permit</td><td>√</td><td></td><td></td></tr>
<tr><td>Operating expenses and Maintenance</td><td></td><td>√</td><td></td></tr>
<tr><td>performance</td><td></td><td>√</td><td></td></tr>
</table></td><td>↑</td><td rowspan="6">Risk Management</td><td>• (Nguyen et al. 2018)</td></tr>
<tr><td>State/User</td><td>Protecting public interest</td><td>Initiatives considered:
• Revenue sharing
• Debt liability</td><td>Contract provisions allow sharing in upside and limit long-term commitments by state</td><td>• Fully met
• CDA incudes revenue-sharing scheme between the public and private partners based on base case.
• TxDOT will not encounter financial burdens for any default risks.
• LBJIG used just $445 million of the $700 million in public funds made available by the State of Texas to help bidders finance the project.</td><td>↑</td><td>• (Jacobs 2010)</td></tr>
<tr><td rowspan="4">Implementation</td><td>State</td><td>Specified asset delivered</td><td>Opens on time and conforms to agreed scope</td><td>• Project opens when expected.
• Scope of work completed and commissioned</td><td>• Fully met
• The exiting corridor has been expanded to 18-20 lanes by digging a giant trench instead of tunnel approach in the center of I-635.
• Six new lanes with variable tolls have been built in the trench.
• Eight reconstructed un-tolled lanes have been cantilevered above the managed lanes</td><td>↑</td><td>• (Reinhardt 2010)</td></tr>
<tr><td>Investor</td><td>On time and on budget</td><td>Cost and schedule overruns</td><td>Cost increases or delays impact revenue amount or timing and decrease ROI</td><td>• Fully met
• Opened on budget and three months ahead of schedule</td><td>↑</td><td>• (USDOT 2010)
• (Reinhardt 2010)</td></tr>
<tr><td rowspan="2">Producer</td><td rowspan="2">Effective and efficient delivery</td><td>Meets SPV milestones</td><td>Meets SPV/Investor requirement for facility opening</td><td>• Fully met
• Project (four segments) delivered ahead of schedule</td><td>↑</td><td rowspan="2">• (Bolaños et al. 2017)</td></tr>
<tr><td>Number of claims or disputes</td><td>Greater number of claims/disputes indicates delivery issues</td><td>• Fully met
• None reported</td><td>↑</td></tr>
</table>

<table>
<tr><th>Setting/Phase</th><th>Stakeholder</th><th>Key interests</th><th>Performance indicators</th><th>Interpretation</th><th>LBJ expressway</th><th>Interest</th><th>Performance dimension</th><th>Sources for Observations</th></tr>
<tr><td rowspan="3"></td><td></td><td></td><td>Number of major accidents or incidents</td><td>Greater number of accidents or incidents indicates delivery issues</td><td>• Fully met
• Ferrovial claimed LBJ is one of the safest projects with no major incident. (self-reported)</td><td>↑</td><td rowspan="3"></td><td rowspan="2">• (Ferrovial 2021)</td></tr>
<tr><td rowspan="2">User</td><td rowspan="2">Minimal inconveniences and environmental impacts</td><td>Major incidents during construction</td><td>Occurrence and number of major incidents (environmental, safety, traffic disruptions) indicative of adverse impacts on community</td><td>• Partially met
• Two hundred homeowners sued contractor, claiming up to $60 million in compensation,</td><td>↔</td></tr>
<tr><td>Complaints from citizens/businesses</td><td>Number of complaints indicative of adverse impacts on community</td><td>• Partially met
• February 2017, Trinity Infrastructure, to provide $248,000 to compensate a homeowner for construction impacts, including cracked walls, ceilings, and floors.(Yet pending)</td><td>↔</td><td>• (Wilonsky 2015)</td></tr>
<tr><td rowspan="3">Service delivery</td><td rowspan="2">State</td><td rowspan="2">Service meets or exceeds expectations</td><td>Avg. travel speed changes</td><td>Increases or decreases in avg travel speed (or trip times) suggest level of service provided</td><td>• Fully met
• GP lane : avg 10% increase, speed 50mph from 40 mph (Feb. 2015)
• ML – 65 mph avg (50 mph to maintain)
• Overall congestion time has decreased by 77%.
• Average 2015 at least 10% higher than speeds in the general-purpose lanes.
• Despite a 10% increase in general purpose lane traffic volumes</td><td>↑</td><td rowspan="2">Service Quality</td><td>• Sanchez (2016)</td></tr>
<tr><td>Penalties or sanctions / bonuses</td><td>Number and frequency of sanctions/bonuses suggest poor/good service and management</td><td>• No sanctions reported</td><td>↑</td><td>• (Reinhardt 2010)
• (Poole 2011)</td></tr>
<tr><td>Investor</td><td>Anticipated return on investment</td><td>Actual T&R</td><td>• Actual > Expected: ROI increase
• Actual = Expected: ROI expected
• Actual < Expected: ROI decrease</td><td>
<table>
<tr><th rowspan="2">Y</th><th>Q1</th><th>Q2</th><th>Q3</th><th>Q4</th></tr>
<tr><th>T R ($ M)</th><th>T R ($ M)</th><th>T R ($ M)</th><th>T R ($ M)</th></tr>
<tr><td>2019</td><td>33.6</td><td>38.3</td><td>40.1</td><td></td></tr>
<tr><td>2018</td><td>32.8</td><td>31.6</td><td>31.9</td><td>34.1</td></tr>
<tr><td>2017</td><td>28.2</td><td>25.7</td><td>30.8</td><td>27</td></tr>
<tr><td>2016</td><td>15.00</td><td>18.9</td><td>20.4</td><td>21</td></tr>
<tr><td>2015</td><td>N/A</td><td>N/A</td><td>N/A</td><td>11.5</td></tr>
</table>
Fully met
Current traffic revenue is available and has positive trend.
<table>
<tr><th rowspan="2">Year</th><th>Q1</th><th>Q2</th><th>Q3</th><th>Q4</th></tr>
<tr><th>Total transactions (Millions)</th><th>Total transactions (Millions)</th><th>Total transactions (Millions)</th><th>Total transactions (Millions)</th></tr>
<tr><td>2019</td><td>10.9</td><td>11.9</td><td>12.5</td><td>N/A</td></tr>
<tr><td>2018</td><td>10.3</td><td>11.4</td><td>11</td><td>11.4</td></tr>
<tr><td>2017</td><td>10.1</td><td>10.4</td><td>10.7</td><td>10.6</td></tr>
<tr><td>2016</td><td>7.3</td><td>9.7</td><td>10.1</td><td>10</td></tr>
<tr><td>2015</td><td>N/A</td><td>N/A</td><td>N/A</td><td>7</td></tr>
</table>
</td><td>↑</td><td>Revenue and operations</td><td>• (LBJ EXpress Q2 2016)
• (LBJ EXpress Q3 2016)
• (LBJ EXPRESS 2018)
• (LBJ Express Project 2021)</td></tr>
</table>

Setting/Phase	Stakeholder	Key interests	Performance indicators	Interpretation	LBJ expressway	Interest	Performance dimension	Sources for Observations
			Equity invested or divested	• Divested equity suggests meeting ROI • Invested equity suggests covering revenue shortfalls	• The refinancing of $622 million in 2020, consists of the issuance of tax-exempt bonds (PABs), for total proceeds of $615M, to replace those issued in 2010 as part of the original financing of the project.	↑		• (Meridiam 2020)
	Producer	Asset performance/Operation effectiveness	Compliance with standards	No sanctions or penalties indicates compliance	• Fully met • No sanctions/penalties observed	↑	**Service Quality**	• Interview data
			No increased oversight by the State	Increased oversight suggests consistent non-compliance	• Yes, No increased oversight – Fully met • State receives monthly reports spend and traffic volume generally	↑		
	User	Adds expected value	User patronage and satisfaction	• Usage level indicates fulfills purpose and/or user satisfaction. • Indicators of asset purpose being met (trip time reliability, etc.)	• The managed lanes are dynamically priced following a six-month introductory fixed-price schedule. • Customer satisfaction grew both in managed and general-purpose lanes (46% in 2013 to 76% in 2016.)	↑		• (Wood et al. 2016) • (Garvin 2019)
			Increase of job creation. Increase of commercial development	• More jobs (short or long-term) as consequence of project benefits community • More commercial development as consequence of project benefits community	• Fully met • LBJIG estimates that direct construction and operation will result in 1,500 jobs. • TxDOT cite that 27,800 jobs are supported, meaning the investment ripple effects could create almost 70,000 jobs across the economy.	↑	**Project Impact**	• (Nichols 2011)

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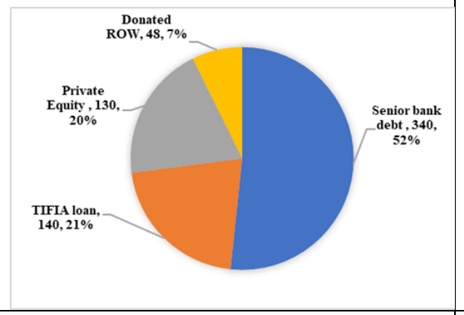
Stages/Phases	Stakeholder	Key interest and expectations	Performance indicators	Interpretation	Observations/Measurement	Interest	Performance dimension	Sources for Observations
Enabling Environment	State	Enabling legislation supports P3 project delivery	• Types and number of projects authorized. • Solicited and unsolicited proposals permitted. • Funding sources authorized	• Broad: no restrictions on # or types of projects; solicited and unsolicited allowed; no or limited restrictions on use of public funds • Limited: restrictions on types and # of projects; unsolicited proposals are not authorized; restrictions on public funds	• Limited (restricted) • Authorized Caltrans to enter into agreements for up to 4 demonstration projects. • Authorized up to a 35-year lease. • Authorized the developers to charge tolls. • Did not allow state or federal funds to be used to supplement private capital.	↓	**Project Environment**	• (PPIAF 2009b) • (Caltrans 2010)
	Investor & Producer	Socio-political stability that limits risks	Legislative or executive oversight process defined	Process published and readily available	• No executive oversight process is defined and published.	↓		• (Caltrans 2009)
			Legislation or executive guidelines define any stakeholder engagement requirements	Non-NEPA public engagement required by enabling legislation or agency guidelines	• Not Met • None defined.	↓		
			Limited opportunity for "last minute" modification or termination of a project by legislative action	• Established evaluation and approval process does not require project-specific legislative approvals	• Legislative approval of selected demonstration projects not required	↑		
		Favorable investment environment	Record of transactions and private investment in transportation projects • Number of prior P3 projects • Private equity and debt in prior projects Inclusion of financial instruments like TIFIA or PABs	• Number of prior projects • Financial structure of prior projects ○ Debt: equity ratio	• No prior transactions – Not met	↓		• (Caltrans 1989) • (Build America Bureau 2012b)
			Creditworthiness/rating history of owner	Fitch/Moody's/S&P Issuer Rating where higher indicative of agency/state capacity to meet financial obligations and lower the opposite.	• Fully met	↑		
			Types of governmental instruments or programs available to support private investment	In US: • TIFIA program • PABs authorized	• Only TIFIA available - Partially Met • TIFIA program was not active until 1998, so not available at time of original proposal. • Delays in development made it an option at time of implementation. • PABs not authorized at time of financial close	↔		
	User/ Citizen	Checks & balances in development process	Process for accepting/approving projects as P3 is defined and followed	Process is published and readily available	• Process established but not fully documented- Partially met. • Caltrans established evaluation process and criteria after AB680 legislation was passed, so process not established or documented beforehand	↔		• (Caltrans 2009)
			Mandated opportunities for citizen/community input and engagement	Enabling legislation or agency guidelines include mandated public engagement requirements	• Through AB 680, CTC authorized Caltrans to execute the four projects. No mandated public engagement not found.	↓		

Stages/Phases	Stakeholder	Key interest and expectations	Performance indicators	Interpretation	Observations/Measurement	Interest	Performance dimension	Sources for Observations
Project shaping	State	Clear need for project	Project in state's long term transportation plan	Yes: project in LT or ST plan indicative of need No: indicative that not a previously identified need	• Yes: Fully met • In 1984, the San Diego Association of Governments (SANDAG) added SR-125 to its Regional Transportation Plan. • State: • Planning for this corridor originated in the late 1950s. • The California Transportation Commission's proposed facility adopted into the state highways systems in the early 1960s. • In 1976, the state was unable to identify funds to build the freeway, so the corridor was abandoned.	↑	**Identification of Need**	• (PPIAF 2009)
			Project in published pipeline	Yes: illustrates need and signals to such to interested stakeholders No: not in pipeline or agency does not publish pipeline so not indicative of need or signaling	• No: practice not followed at time -Not met	↓		
			Current conditions • LOS/congestion • Safety • Etc.	Degrading or poor current conditions indicative of need: poor or declining levels of service, safety, etc.	• Existing highway facility does not the connectivity to commute the largest area of industrial areas (San Diego County). • Requirements to improve regional mobility and create a direct access to US Mexico border.	↑		• Interview data
		Due diligence to determine P3 suitability	P3 value drivers considered: • Risk transfer • Accelerated delivery. • Private efficiencies	Qualitative factor(s) identified by public agency as rationale for P3	• AB 680 legislation passed to leverage private capital and efficiencies - Fully met	↑	**P3 Determination**	• (Mills 2012)
			Planning/feasibility studies	Types of studies completed and published indicate quality and depth of feasibility assessment	• Full complement of studies completed. • The proposed facility adopted into the state highway system by the California Transportation Commission in the early 1960s	↑		
			T&R studies	• Completed studies and source indicative of demand/revenue potential Source indicative of potential for optimism bias	• Private franchisee responsible for T&R studies	↔		
			Business Case and/or V*f*M analysis	Yes: Completed and published ex-ante and/or ex-post studies indicative of P3 suitability No: Ex-ante and/or ex-post studies not completed	• State did not conduct V*f*M or Business Case Analysis	↓		
		Stakeholder Management	Stakeholder engagement strategy • Non-mandatory engagement • Citizen advisory committees, etc.	• Types of non-mandatory public engagements indicative of stakeholder involvement and input	• Before approving a project, the Commission will conduct a public hearing on the project as a scheduled meeting agenda item.	↑	**Stakeholder Management**	• (Caltrans 1989)

Stages/Phases	Stakeholder	Key interest and expectations	Performance indicators	Interpretation	Observations/Measurement	Interest	Performance dimension	Sources for Observations
				Frequency of non-mandatory public engagement indicative of stakeholder involvement and input				
	Investor	Government commitment	Industry forums held and types of public contributions/enhancements.	Number and type of industry forums signal openness to industry input	• No industry forums held for project • No public funding contribution • Land developers dedicated approximately 70 percent of the right-of-way for the toll project, a value of approximately $40 million	↓	**Public Agency Capacity**	• (Trasportation Research Board 2009)
		Experienced/reliable agency	Dedicated unit for alt. delivery or P3	Presence of dedicated office suggests public agency competency	• No dedicated office	↓		• (FWHA 2006)
			Type and years of experience	• Experienced: 3 or more executed prior projects • Developing: 1-2 executed prior projects Inexperienced: 0 projects	• Inexperienced to Developing – Partially met • Caltrans had no experience at time of award. • SR 91 implemented by time SR125 reached financial close	↔		
		Project is attractive	Revenue potential • Tolling: common in region or not • Project characteristics: ○ Standalone vs. urban network ○ Extension/expansion vs. greenfield ○ Highly congested vs. limited congestion ○ Few competing routes vs. many alternatives • Users: high-income, time sensitive vs. average/lower income	• Tolling: common that facilities are tolled in region improves revenue potential • Project characteristics: revenue potential improved when facility is standalone and extension/expansion in highly congested corridor or region with few competing routes. Users: revenue potential when users are of higher income and time sensitive.	• Partially met • Toll is not common in the area • Standalone facility • Suburban/rural setting • New build (green field) • Less congested • Part of small network • User : Lower income residents, commercial trucks	↔	**P3 Determination**	
		Statutory clearances	ROW acquisition	Progress or completion: • Signals public sector commitment • Reduces risk of termination or delay	• Not met • As per the franchise conditions, ROW acquisition and environmental permit must be completed by franchisee to proceed. • The franchise holders were responsible for the environmental clearance and faced unprecedented opposition from various groups. • CTV was responsible for securing the environmental permits for the project, with the contract language stating that Caltrans will act as merely a support in the process.	↓		• (Caltrans 2009, 2010; IJ Global 2003)
			NEPA progress			↓		

Stages/Phases	Stakeholder	Key interest and expectations	Performance indicators	Interpretation	Observations/Measurement	Interest	Performance dimension	Sources for Observations
	Investor & Users/Citizen	Stakeholder engagement	Number of public meetings	Amount of opportunities for public input – more meetings increases likelihood that either support or opposition will surface	• Severe opposition observed.- Not met • The public resentment about maintenance of endangered butterfly and owl species, • Acquiring 1000 acres of land to be used as an open space preserve, and building and maintaining local parks, playing fields, campgrounds, etc.	↔		• (AECOM 2007)
			Forms of communication/engagement	Types/forms of engagement utilized – multiple means for input increases likelihood that either support or opposition will surface	• Severe opposition observed.- Not met	↔		
	Producer	Scope of work offers degrees of freedom	Design flexibility exists/remains (i.e., design not advanced beyond 30%)	Level of design completed – schematic or illustrative design levels provide opportunity for alternatives/technical enhancements	• Concessionaire had control over the schematic and detailed design – Fully met	↑		• (AECOM 2007)
		Baseline conditions understood	Potential for unforeseen conditions	Site conditions in existing corridor more likely known	• Greenfield – Not met	↓		
Procurement	State	Best value evaluation process	Evaluation process and criteria	• Competitive vs. Non-Competitive If competitive, procurement follows "best-value" principles/practices	• Quasi-competitive process – Partially met • Caltrans pre-qualified 10 consortiums based on predefined criteria. • 'Privatization Advisory Committee' was formed to evaluate eight unique conceptual proposals.	↔		• (AECOM 2007) • (Garvin 2019)
		Market interest	Number short-listed teams	Higher number improves competitive potential	• 10 – Fully met • 10 teams pre-qualified to submit conceptual proposals	↑		• (Miller 2002)
			Number of proposals received	Higher number improves likelihood of receipt of "best value"	• 8 – Fully met • 8 teams responded to RFP that were scored by Caltrans	↑		
		Minimize financial commitments or exposure	• Amount and type of public contributions • Financial structure • Debt/Equity ratio	• Limited public subsidies or guarantees decreases exposure. • Debt: equity ratio – more equity, more private leverage, and stake	• Total project cost – 660 million • No public subsidy of equity- Fully met • No state fund and public equity involved (CTV)	↑		• (FWHA 2006)

Stages/Phases	Stakeholder	Key interest and expectations	Performance indicators	Interpretation	Observations/Measurement	Interest	Performance dimension	Sources for Observations
					• 			
	Investor	Reliable and fair process	Procurement and contracting guidelines in place	Defined procurement process improves predictability	• Not met • Process proceeded incrementally, so respondents had little knowledge of how this process would proceed at outset	↓	**Procurement Process**	• (Miller 2002) • (IJ Global 2003)
			State limits number of competitors through shortlisting process	3-4 shortlisted teams improve probability of award and return on business development funds	• 10 short-listed teams – not met	↓		
			Time from notice to commercial close & commercial to financial close	• Duration from notice to commercial close indicative of efficiency and effectiveness of procurement process • Duration from commercial to financial close indicative of quality of agreement	• Not met • Took over nine years to get the environment clearance due to litigation.	↓		
	Producer	Potential to modify scope of work to add value/reduce cost	ATC/AFC process -OR- Potential to negotiate adjustments of scope	• Inclusion of process in RFP provides opportunity to add value through technical/financial enhancements -OR- • Ability to negotiate scope provides opportunity to add value through technical/financial enhancements. • Probity safeguards public and private sectors	• Responsible to defining scope – Fully met • Franchise holders had control over scope of work and ability to modify as necessary	↑		
	User	Transparent and legitimate process	Followed relevant procurement laws/regulations	Complied with regulations	• Followed AB 680 requirements – Fully met • Caltrans complied with requirements established by AB 680	↑		• (Miller 2002) • (Caltrans 2009)
			Progress and outcomes communicated	Communicated progress and outcomes to public	• Yes, Fully met • Citizen, citizen group, and agency (local and Govt.) agency were heavily involved (opposition) as project progressed.	↑		
			Procurement documents publicly available	Made procurement documents readily available (i.e., posted to website)	• Not available – Not met	↓		
			Rationale for selecting preferred known	Agency identifies and communicates basis of selection	• Proposals received were scored and ranked - Partially met	↔		

<table>
<tr><th>Stages/Phases</th><th>Stakeholder</th><th>Key interest and expectations</th><th>Performance indicators</th><th>Interpretation</th><th>Observations/Measurement</th><th>Interest</th><th>Performance dimension</th><th>Sources for Observations</th></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td>• One of four pilot projects selected based on scoring approach adopted by Caltrans</td><td></td><td></td><td></td></tr>
<tr><td rowspan="2">Contract</td><td>S, I, P</td><td>Equitable allocation of risk</td><td>Risk profile</td><td>Risks are apportioned in accordance with prevailing practices or precedents</td><td><table><tr><th>Risk(s)</th><th>Public</th><th>Private</th><th>Shared</th></tr><tr><td>Design</td><td></td><td>√</td><td></td></tr><tr><td>Permit</td><td></td><td></td><td>√</td></tr><tr><td>Financing</td><td></td><td>√</td><td></td></tr><tr><td>Right of way</td><td></td><td>√</td><td></td></tr><tr><td>Environmental permit</td><td></td><td>√</td><td></td></tr><tr><td>Operating expenses and Maintenance</td><td></td><td>√</td><td></td></tr><tr><td>performance</td><td></td><td>√</td><td></td></tr></table></td><td>↔</td><td rowspan="2">Risk Management</td><td rowspan="2">• (Nguyen et al. 2018)</td></tr>
<tr><td>State/User</td><td>Protecting public interest</td><td>Initiatives considered:
• Revenue sharing
• Debt liability</td><td>Contract provisions allow sharing in upside and limit long-term commitments by state</td><td>• Fully met
• No revenue sharing.
• No debt liability on public.</td><td>↑</td></tr>
<tr><td rowspan="6">Implementation</td><td>State</td><td>Specified asset delivered</td><td>Opens on time and conforms to agreed scope</td><td>Project opens when expected.
Scope of work completed and commissioned</td><td>• Delays in starting construction and delays during construction - Not met
• Construction started 9 years later than expected.
• Construction for the project began in May 2003 and was completed in November 2007, a delay of roughly 13 months from the contractual completion date .</td><td>↓</td><td rowspan="5">Project Delivery</td><td rowspan="5">• (AECOM 2007)
• (Soule and Tassin 2007)</td></tr>
<tr><td>Investor</td><td>On time and on budget</td><td>Cost and schedule overruns</td><td>Cost increases or delays impact revenue amount or timing and decrease ROI</td><td>• Not Fully met
• Initial project cost was approximate $400 million and later it reached $668 million. (Construction which was proposed to begin in 2002 and complete in 2005
• Construction began in May 2003 and was completed in November 2007 (13 months delay)</td><td>↓</td></tr>
<tr><td rowspan="3">Producer</td><td rowspan="3">Effective and efficient delivery</td><td>Meets SPV milestones</td><td>Meets SPV/Investor requirements for facility opening</td><td>• Not met
• Construction began in May 2003 and was completed in November 2007 (13 months delay)</td><td>↓</td></tr>
<tr><td>Number of claims or disputes</td><td>Greater number of claims/disputes indicates delivery issues</td><td>• Partially met.
• Claim filed by contractors; dismissed during bankruptcy</td><td>↔</td></tr>
<tr><td>No major accidents or incidents</td><td>Greater number of accidents or incidents indicates delivery issues</td><td>• Fully met.
• None observed</td><td>↑</td></tr>
<tr><td>User</td><td></td><td>Major incidents during construction</td><td>Occurrence and number of major incidents (environmental, safety, traffic</td><td>• No major incident during construction (no evidence found of major incidents)</td><td>↑</td></tr>
</table>

<table>
<tr><th>Stages/Phases</th><th>Stakeholder</th><th>Key interest and expectations</th><th>Performance indicators</th><th>Interpretation</th><th>Observations/Measurement</th><th>Interest</th><th>Performance dimension</th><th>Sources for Observations</th></tr>
<tr><td></td><td></td><td>Minimal inconveniences and environmental impacts</td><td></td><td>disruptions) indicative of adverse impacts on community</td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td><td>Complaints from citizens/businesses</td><td>Number of complaints indicative of adverse impacts on community</td><td>• No major observation</td><td>↑</td><td></td><td></td></tr>
<tr><td rowspan="3">Service delivery</td><td rowspan="2">State</td><td rowspan="2">Service meets or exceeds expectations</td><td>Service indicators (dependent on type and purpose of project)</td><td>Increases or decreases in avg travel speed (or trip times) suggest level of service provided</td><td>• Fully met
• State mandated 65mph was followed.
• Congestion on I 905 and 905 has decreased. Actual traffic was 22,600 vehicles/day (less than half the expected amount) in October 2008.
• SANDAG reduced the toll rate up to 40%
•</td><td>↑</td><td rowspan="2">Service Quality</td><td>• (Schmidt 2010)</td></tr>
<tr><td>Penalties or sanctions Bonuses</td><td>Number and frequency of sanctions/bonuses suggest poor/good service and management</td><td>• After SANDAG took over the facility they reduced the toll rate up to 40%, since then the use of the faculty has increased.
• Highly impacted by COVID
• In March 2010, SBX LP filed for bankruptcy. During the bankruptcy, the court reviewed over 62 claims totaling more than $1 billion that were made against the Concessionaire.</td><td>↑</td><td>• (PPIAF 2009)</td></tr>
<tr><td>Investor</td><td>Anticipated return on investment</td><td>Actual Traffic and revenue</td><td>• Actual > Expected: ROI increase
• Actual = Expected: ROI expected
• Actual < Expected: ROI decrease</td><td>• Actual traffic was 22,600 vehicles/day (less than half the expected amount) in October 2008.
• In addition, average daily revenue collections were $58,341 – well short of the daily expectation of $102,000.
<table>
<tr><th>Year</th><th>Projected revenue</th><th>Actual revenue</th><th>Total operating expenses</th><th>Remarks</th></tr>
<tr><td>2019</td><td>34,090,000</td><td></td><td></td><td></td></tr>
<tr><td>2018</td><td>33,220,000</td><td>41,748,531</td><td>24,221,834</td><td>Includes debt services</td></tr>
<tr><td>2017</td><td>32,180,000</td><td>37,618,421</td><td>23,234,114</td><td>Includes debt services</td></tr>
<tr><td>2016</td><td>30,640,000</td><td>35,075,079</td><td>22,137,122</td><td>Includes debt services</td></tr>
<tr><td>2015</td><td>28,010,000</td><td>32,031,282</td><td>22,003,344</td><td>Includes debt services</td></tr>
<tr><td>2014</td><td>25,970,000</td><td></td><td></td><td></td></tr>
<tr><td>2013</td><td>22,690,000</td><td></td><td></td><td></td></tr>
<tr><td>2012</td><td>24,790,000</td><td></td><td></td><td></td></tr>
<tr><td>2011</td><td colspan="3">Periods of Bankruptcy</td><td></td></tr>
<tr><td>2010</td><td colspan="3">Periods of Bankruptcy</td><td></td></tr>
<tr><td>2009</td><td>21,000,000</td><td>16,000,000</td><td></td><td></td></tr>
<tr><td>2008</td><td>28,000,000</td><td>22,000,000</td><td></td><td></td></tr>
</table>
• SANDAG began operating the toll road in 2012 and reduced tolls by up to 40%.</td><td>↔</td><td>Revenue and Operations</td><td>• (SANDAG 2019)
• (SANDAG 2018)
• (PPIAF 2009)
• (Reston Citizens Association 2012).</td></tr>
<tr><td></td><td></td><td>Equity invested or divested</td><td>• Divested equity suggests meeting ROI
• Invested equity suggests covering revenue shortfalls</td><td>• Equity “lost” – not met
• The outstanding balance for commercial lenders before bankruptcy was $363 million (actual loan was $340 million, 18 years team, until 2021).</td><td>↓</td><td></td><td>• (Giuliano et al. 2012)
• (AASHTO 2017)
• (Yates 2012)</td></tr>
</table>

<table>
<tr><th>Stages/Phases</th><th>Stakeholder</th><th>Key interest and expectations</th><th>Performance indicators</th><th>Interpretation</th><th>Observations/Measurement</th><th>Interest</th><th>Performance dimension</th><th>Sources for Observations</th></tr>
<tr><td rowspan="4"></td><td></td><td></td><td></td><td></td><td>• After restructuring, the bankruptcy courts heavily wrote off the lender’s debt to $195 million.
• Following the bankruptcy proceedings, the South Bay Expressway was purchased by San Diego Association of Governments (SANDAG) in July
• 2011 for $344.5 million ($2011) in cash and debt. SANDAG began operating the toll road in 2012 and reduced tolls by up to 40%.
• In September 2017, the SANDAG offloaded Fixed-rate Series 2017 Revenue Bond which generated $194 million.
• This refinancing strategy helped SANDAG’s outstanding loans and secured a more conservative level debt service structure that will save more than $147 million over the 26-year life of the loans.</td><td></td><td rowspan="4"></td><td></td></tr>
<tr><td rowspan="2">Producer</td><td rowspan="2">Asset performance/Operation effectiveness</td><td>Compliance with standards</td><td>No sanctions or penalties indicates compliance</td><td>• According to SANDAG, the road is performing above expectations and a rating upgrade is expected from Fitch.
• SANDAG has found the road is profitable and demonstrates the agency’s successful investment.</td><td>↑</td><td>• Interview data</td></tr>
<tr><td>No increased oversight by the State</td><td>Increased oversight suggests consistent non-compliance</td><td>• No increased oversight.</td><td>↑</td></tr>
<tr><td rowspan="2">User</td><td rowspan="2">Adds expected value</td><td>User patronage and satisfaction</td><td>• Usage level indicates fulfills purpose and/or user satisfaction.
• Indicators of asset purpose being met (trip time reliability, etc.)</td><td>• Fully met
• Underutilized at outset
• SANDAG dropped toll rates, so more affordable</td><td>↔</td><td>• (AASHTO 2013)</td></tr>
<tr><td>• Increase of job creation,
• Increase of commercial development.</td><td>• More jobs (short or long-term) as consequence of project benefits community
• More commercial development as consequence of project benefits community</td><td><table><tr><th>Measure</th><th>Pre-Project</th><th>Post-Project</th><th>Change</th><th>% Change</th></tr><tr><td>Personal Income Per Capita</td><td>22,929</td><td>30,589</td><td>7,660</td><td>33.41 %</td></tr><tr><td>Economic Distress</td><td>0.64</td><td>1.67</td><td>1.03</td><td>160.94%</td></tr><tr><td>Number of Jobs</td><td>618,032</td><td>646,654</td><td>28,622</td><td>4.63%</td></tr><tr><td>Tax Revenue (in $M's)</td><td>734</td><td>1,094</td><td>360</td><td>49.05 %</td></tr><tr><td>Population</td><td>1,396,956</td><td>1,590,778</td><td>193,822</td><td>13.87 %</td></tr></table></td><td>↑</td><td>Project Impact</td><td>• (AASHTO 2017)</td></tr>
</table>

B.4 SH 130 (5&6)

Stages/Phases	Stakeholder	Key interest and expectations	Performance indicators	Interpretation	Observations/Measurement	Interest	Performance dimension	Sources for Observations
Enabling Environment	State	Enabling legislation supports P3 project delivery	• Types and number of projects authorized. • Solicited and unsolicited proposals permitted. • Funding sources authorized	• Broad: no restrictions on # or types of projects; solicited and unsolicited allowed; no or limited restrictions on use of public funds • Limited: restrictions on types and # of projects; unsolicited proposals are not authorized; restrictions on public funds	• Broad – Fully Met • Texas' 2003 House Bill 3588 authorized TxDOT to conduct transportation P3s using Comprehensive Development Agreements (CDA) – both solicited and unsolicited proposals • On May 29, 2005, Texas State Legislature passed HB 2702 which clarified certain provisions. • The development, financing, operation, and maintenance of a facility for a specific time period up to 52 years. • DBB/DB and transportation projects • Chapter 223 also mandates that CDAs, including concession agreements, must be arrived at through a competitive bidding process.	↑	**Project Environment**	• (TxDOT 2015a) • (TxDOT 2009) • (Canales 2020) • (Glover et al. 2016) • (AECOM 2007b) p. 3-98 to 3-99
	Investor & Producer	Socio-political stability that limits risks	Legislative or executive oversight process defined	• Process published and readily available	• The project is part of TTC 35 master plan. The process and planning of TTC 35 is well documented and published.	↑		• (Cassidy et al.2016) • (TxDOT 2015a)
			Legislation or executive guidelines define any stakeholder engagement requirements	• Non-NEPA public engagement required by enabling legislation or agency guidelines	• TxDOT will review the request so that before a public hearing is set, all requirements are met. • To receive comment on the petition, TxDOT shall hold one to more public hearings. • TxDOT will post notice of public hearing in Texas Register. • County will advertise the hearing in accordance with a public outreach plan developed with TxDOT	↓		• (O'Connor et al. 2005b) • (TxDOT 2007a)
			Limited opportunity for "last minute" modification or termination of a project by legislative action	• Multi-phase evaluation process does not include any legislative approvals; once CTB and Advisory Panel recommendations are made/approved, then VDOT can proceed to negotiate a comprehensive agreement.	• No legislative approval required – Fully Met	↑		
		Favorable investment environment	Record of transactions and private investment in transportation projects • Number of prior P3 projects • Private equity and debt in prior projects	• Number of prior projects • Financial structure of prior projects ○ Debt: equity ratio Inclusion of financial instruments like TIFIA or PABs	• • None – Not met •	↓		

<table>
<tr><th>Stages/Phases</th><th>Stakeholder</th><th>Key interest and expectations</th><th>Performance indicators</th><th>Interpretation</th><th>Observations/Measurement</th><th>Interest</th><th>Performance dimension</th><th>Sources for Observations</th></tr>
<tr><td rowspan="4"></td><td rowspan="2"></td><td rowspan="2"></td><td>Creditworthiness/rating history of owner</td><td>• Fitch/Moody’s/S&P Issuer Rating where higher indicative of agency/state capacity to meet financial obligations and lower the opposite.</td><td>• To ensure access to low-interest debt, “AAA”</td><td>↑</td><td rowspan="4"></td><td></td></tr>
<tr><td>Types of governmental instruments or programs available to support private investment</td><td>In US:
• TIFIA program
• PABs authorized</td><td>• Both TIFIA and PABs available – Fully met
• TIFIA program active
• PABs authorized by SAFETEA-LU in 2005</td><td>↑</td><td>• (Build America Bureau 2015a)</td></tr>
<tr><td>User/ Citizen</td><td>Checks & balances in development process</td><td>Process for accepting/approving projects as P3 is defined and followed</td><td>Process is published and readily available</td><td>• Four phase evaluation process is published and readily.
• Toll viability study
• Prequalification
• Bid preparation and evaluation.
• Contract finalization</td><td>↔</td><td>• (O’Connor et al. 2005b)</td></tr>
<tr><td>Mandated opportunities for non-NEPA related citizen/community input and engagement</td><td>Enabling legislation or agency guidelines include mandated public engagement requirements</td><td>• Met</td><td>↑</td></tr>
<tr><td rowspan="6">Project shaping</td><td rowspan="6">State</td><td rowspan="3">Clear need for project</td><td>Project in long term transportation plan</td><td>Yes: project in LT or ST plan indicative of need
• No: indicative that not a previously identified need</td><td>• In the early 2000s, TxDOT was investigating the feasibility of developing a new long-distance route parallel to I-35 called the Trans-Texas Corridor 35 (TTC35).</td><td>↑</td><td rowspan="3">Identification of Need</td><td>• AECOM (2007)
• (San Antonio Business Journal, 2003; NewsOXY, 2015).</td></tr>
<tr><td>Project in published pipeline</td><td>Yes: illustrates need and signals to such to interested stakeholders
• No: not in pipeline or agency does not publish pipeline so not indicative of need or signaling</td><td>• No : practice not followed at time</td><td>↓</td><td></td></tr>
<tr><td>Current conditions
• LOS/congestion
• Safety
• Etc.</td><td>Degrading or poor current conditions indicative of need: poor or declining levels of service, safety, etc.</td><td>•<table><tr><td>Areas</td><td>1980</td><td>2003</td><td>Growth</td></tr><tr><td>Population</td><td>14.2 M</td><td>22 M</td><td>57% increase</td></tr><tr><td>Registered vehicle</td><td>11.7 M</td><td>18.9 M</td><td>60% increase</td></tr><tr><td>Lane miles</td><td>175,763 miles</td><td>189,254 miles</td><td>7.6% increase</td></tr></table></td><td>↔</td><td>• AASHTO (2005) [Spring Board meeting, May 9, 2005]</td></tr>
<tr><td rowspan="3">Due diligence to determine P3 suitability</td><td>P3 value drivers considered:
• Risk transfer
• Accelerated delivery.
• Private efficiencies</td><td>• Qualitative factor(s) identified by public agency as rationale for P3</td><td>• SH-130) would have been completed 25 years sooner if follows P3 development. (https://www.pwfinance.net/document/research_reports/Research%20Legal%20NCHRP.pdfpage 14)
• Development as a P3 was proposed by Cintra not TxDOT (TTC-35)
•</td><td>↔</td><td rowspan="3">P3 Determination</td><td>• (Belly 2003)</td></tr>
<tr><td>Planning/feasibility studies</td><td>• Types of studies completed and published indicate quality and depth of feasibility assessment</td><td>• SH 130, running in parallel to I-35, was intended as an alternative to the busy I-35 to relieve congestion and increase mobility.</td><td>↑</td><td>• (Geiselbrecht et al., 2008)</td></tr>
<tr><td>T&R studies</td><td>• Completed studies and source indicative of demand/revenue potential
• Source indicative of potential for optimism bias</td><td>• Texas DOT performed due diligence activities (including traffic and revenue studies, surveys, and geotechnical investigations) and obtained NEPA environmental approval</td><td>↑</td><td>• (Transportaion Research Board 2009)</td></tr>
</table>

Stages/Phases	Stakeholder	Key interest and expectations	Performance indicators	Interpretation	Observations/Measurement	Interest	Performance dimension	Sources for Observations
			Business Case and/or V*f*M analysis	Yes: Completed and published ex-ante and/or ex-post studies indicative of P3 suitability No: Ex-ante and/or ex-post studies not completed	• $1.35 Billion project at no cost to State	↔		• (Russell 2008)
		Stakeholder Management	Stakeholder engagement strategy • Non-mandatory engagement • Citizen advisory committees, etc.	• Types of non-mandatory public engagements indicative of stakeholder involvement and input • Frequency of non-mandatory public engagement indicative of stakeholder involvement and input	• Fully met	↑	**Stakeholder Management**	• (Giovanni 2006)
	Investor	Government commitment	Industry forums held and types of public contributions/enhancements.	• Number and type of industry forums signal openness to industry input	• None observed	↓	**Public Sector Capacity**	• (TxDOT 2015c)
		Experienced/reliable agency	Dedicated unit for alt. delivery or P3	• Presence of dedicated office suggests public agency competency	• TxDOT was formed in 1991, but after 2017 CDA agreements are no longer in place.	↔		
			Type and years of experience	• Experienced: 3 or more executed prior projects • Developing: 1-2 executed prior projects • Inexperienced: 0 projects	• Inexperienced, SH 130 (5 & 6) is the first P3 projects	↓		

		Project is attractive	Revenue potential
			• Tolling: common in region or not
			• Project characteristics:
			  ○ Standalone vs. urban network
			  ○ Extension/expansion vs. greenfield
			  ○ Highly congested vs. limited congestion
			  ○ Few competing routes vs. many alternatives
			• Users: high-income, time sensitive vs. average/lower income
				• Tolling: common that facilities are tolled in region improves revenue potential
				• Project characteristics: revenue potential improved when facility is standalone and extension/expansion in highly congested corridor or region with few competing routes.
				• Users: revenue potential when users are of higher income and time sensitive
					• Arterial highway
					• Green field project
					• The project consists of a minimum of two tolled lanes in each direction, with roughly 17 miles of non-tolled frontage road covering all of Segment 5 and part of Segment 6
						↔	**P3 Determination**	• Interview data

		Statutory clearances	ROW acquisition	Progress or completion: • Signals public sector commitment • Reduces risk of termination or delay	• ROW acquisition services are the responsibility of the Developer and are included in the CDA contract.	↑		• (TxDOT 2007c)
			NEPA progress			↑		
	Investor & User	Stakeholder Engagement	Types and number of public meetings	Number of opportunities for public input – more meetings increases likelihood that either support or opposition will surface	• As per Gibson (2016), it is evident that a series of communication held between the landowners at the preconstruction stage about ROW/utility	↔	**Stakeholder Management**	• AECOM (2007)
			Forms of communication/engagement	Types/forms of engagement utilized – multiple means for input increases likelihood that either support or opposition will surface	• SH 130 is a part of TTC 35 program. • Organized opposition to the Trans Texas Corridor • TxDOT has addressed this by making the environmental approval process as transparent as possible. It hosted four rounds of public meetings for the TTC-35 environmental study.	↔		

Stages/Phases	Stakeholder	Key interest and expectations	Performance indicators	Interpretation	Observations/Measurement	Interest	Performance dimension	Sources for Observations
	Producer	Scope of work offers degrees of freedom	Design flexibility exists/remains (i.e., design not advanced beyond 30%)	• Level of design completed – schematic or illustrative design levels provide opportunity for alternatives/technical enhancements	• Fully met	↑	**P3 Determination**	• (Transportaion Research Board 2009)
		Baseline conditions understood	Potential for unforeseen conditions	• Site conditions in existing corridor more likely known	• Greenfield – Not met	↓		
Procurement	State	Best value evaluation process	Evaluation process and criteria	• Competitive vs. Non-Competitive • If competitive, procurement follows "best-value" principles/practices	• Unsolicited proposal. • Cintra-Zachry presented an unsolicited proposal in early 2006, as allowed by the TTC-35 CDA, to develop SH 130's remaining segments 5 and 6.	↔	**Procurement Process**	• (Garvin 2019) • (Russell 2008)
		Market interest	Number short-listed teams	• Higher number improves competitive potential	• Unsolicited proposal exclusively for SH 130 5 & 6	↔		• (Transportaion Research Board 2009) • (AECOM 2007)
			Number of proposals received	• Higher number improves likelihood of receipt of "best value"	• Not exclusively for SH 130 but Cintra was selected for TTC -35 in competitive process. • 01 proposal for SH 130 (5&6)	↔		
		Minimize financial commitments or exposure	• Amount and type of public contributions • Financial structure • Debt/Equity ratio	• " Limited public subsidies or guarantees decreases exposure. • Debt: equity ratio – more equity, more private leverage and stake"	• Senior Bank Loans: $685.8M TIFIA Loan: $430M Private Equity: $209.8M Interest Income: $2.3M	↑		• (FWHA 2006)
	Investor	Reliable and fair process	Procurement and contracting guidelines in place	• Defined procurement process improves predictability	• Yes, SH 130 (5&6) procurement guidelines are available TxDOTs website.	↑		• (Bolaños et al. 2017) • (TxDOT 2007c) • (TxDOT 2007d)[page 10]
			State limits number of competitors through shortlisting process	• 3-4 shortlisted teams improve probability of award and return on business development funds	• Unsolicited proposal	↔		
			Time from notice to commercial close & commercial to financial close	• Duration from notice to commercial close indicative of efficiency and effectiveness of procurement process • Duration from commercial to financial close indicative of quality of agreement	• Cintra-Zachry presented an unsolicited proposal in early 2006, as allowed by the TTC-35 CDA, to develop SH 130's remaining segments 5 and 6. • SH 130 Concession Company, LLC, the special purpose vehicle created by Cintra-Zachry for the project, signed the resulting DBFOM public-private partnership (P3) contract in March 2007.	↑		
	Producer	Potential to modify scope of work to add value/reduce cost	ATC/AFC process included -OR- Potential to negotiate adjustments of scope	• Inclusion of process in RFP provides opportunity to add value through technical/financial enhancements. -OR- • Ability to negotiate scope provides opportunity to add value through technical/financial enhancements. • Probity safeguards public and private sectors	• Cintra-Zachry team had significant control over scope of project and design. • Presumably, Cintra-Zachry were responsible for technical investigations, etc. along route.	↑		• (TxDOT 2007c)
	User	Transparent and legitimate process	Followed relevant procurement laws/regulations	Complied with regulations	• Partly complaint- Partly met	↔		• (O'Connor et al. 2005b)

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<tr><td rowspan="4">Contract</td><td rowspan="4">S, I, P</td><td rowspan="4">Equitable allocation of risk</td><td rowspan="4">Risk profile</td><td rowspan="4">Risks are apportioned in accordance with prevailing practices or precedents</td><td>• The selected developer for TTC 35 further proposed to develop SH 130 and subsequently CDA executed with SH concession Company.</td><td></td><td rowspan="4">Risk Management</td><td rowspan="3">• (Nguyen et al. 2018)</td></tr>
<tr><td>Progress and outcomes communicated</td><td>Communicated progress and outcomes to public</td><td>• Four consortiums was participated for TTC 35 and Cintra was selected for the TTC 35.
• TxDOT did not publish RFQ for the SH 130 (5& 6)</td><td>↓</td></tr>
<tr><td>Procurement documents publicly available</td><td>• Made procurement documents readily available (i.e., posted to website)</td><td>• Yes- Met
• All docs are available at the TxDOT website</td><td>↑</td></tr>
<tr><td>Rationale for selecting preferred known</td><td>• Agency identifies and communicates basis of selection</td><td>• Fully met
• In September 2003, TxDOT received three competing proposals to prepare a master plan for TTC-35
• Cintra-Zachry was the highest rated and subsequently proposed an unsolicited proposal in early 2006, as allowed by the TTC-35 CDA, to develop SH 130’s remaining segments 5 and 6</td><td>↑</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td>
<table>
<tr><th>Risk(s)</th><th>Public</th><th>Private</th><th>Shared</th></tr>
<tr><td>Design</td><td></td><td>√</td><td></td></tr>
<tr><td>Permit</td><td></td><td></td><td>√</td></tr>
<tr><td>Financing</td><td></td><td>√</td><td></td></tr>
<tr><td>Right of way</td><td></td><td>√</td><td></td></tr>
<tr><td>Environmental permit</td><td>√</td><td></td><td></td></tr>
<tr><td>Operating expenses and Maintenance</td><td></td><td>√</td><td></td></tr>
<tr><td>performance</td><td></td><td>√</td><td></td></tr>
</table>
</td><td>↑</td><td></td><td></td></tr>
<tr><td></td><td>State/User</td><td>Protecting public interest</td><td>Initiatives considered:
• Revenue sharing
• Debt liability</td><td>• Contract provisions allow sharing in upside and limit long-term commitments by state</td><td>• The concessionaire has the exclusive right to toll and set rates of the limited access lanes within the guidelines established in the agreement.
• TxDOT has a right to share in the toll revenues on base case.
• The concessionaire would also make a minimum up-front payment of $25 million to TxDOT when the roadway opened and $100 million when authorized a maximum speed limit of 85 mph.</td><td>↑</td><td></td><td>• (Brianne et al. 2016)</td></tr>
<tr><td>Implementation</td><td>State</td><td>Asset delivered according to specifications</td><td>Meeting key specifications and major goals</td><td>• Project opens when expected.
• Principal performance objectives are met (i.e., reduce congestion, improve time – these are specific to each project)</td><td>• Although the project was handed over ahead of schedule, there have been severe flaws in the pavement condition.</td><td>↑</td><td>Project delivery</td><td>• (FWHA 2006)
• (Blunt 2016)</td></tr>
</table>

Stages/Phases	Stakeholder	Key interest and expectations	Performance indicators	Interpretation	Observations/Measurement	Interest	Performance dimension	Sources for Observations
	Investor	On time and on budget	Cost and schedule overruns	• Cost increases or delays impact revenue amount or timing and decrease ROI	• Construction began in April 2009. • The construction cost was $1.36 billion, and the road was opened in 2012. • Opened to traffic in October 2012; service commenced in November 2012	↑		
	Producer	Effective and efficient delivery	Cost overruns or schedule overruns	• Impacts DBJV profit margin and possible liquidated damages	• The SH 130 were completed ahead of schedule and under budget by approximately $438 million, primarily due to lower-than-expected construction bids and good weather	↓		
			Number of claims or disputes	• Greater number of claims/disputes indicates delivery issues	• In 2014, more than 160 pavement defects were identified by an independent company, HDR Engineering, along the southern section of the Texas of 130 as part of the Annual Inspection	↔		
			No major accidents or incidents	Greater number of accidents or incidents indicates delivery issues	• None observed	↔		
	User	Minimal inconveniences and environmental impacts	Major incidents during construction	Occurrence and number of **major** incidents (environmental, safety, traffic disruptions) indicative of adverse impacts on community	• None observed	↔		• (Barr 2018a)
			Complaints from citizens/businesses	Number of complaints indicative of adverse impacts on community	• None observed	↑		
Service delivery	State	Service meets or exceeds expectations	Avg. travel speed Decrease/increase	• Increases or decreases in avg travel speed (or trip times) suggest level of service provided	• 70 mph to 85 mph (raised by concessionaires) • Inferior service quality (pavement related) reported	↓	**Service quality**	• (Owens and Sunseri 2012)
			Penalties or sanctions/ Bonuses	• Number and frequency of sanctions/bonuses suggest poor/good service and management	• In 2014, more than 160 pavement defects were identified by an independent company, HDR Engineering, along the southern section of the Texas of 130 as part of the Annual Inspection	↓		• (HDR 2014)
	Investor	Return on investment	Actual T&R- Decreased or increased	• Actual > Expected: ROI increase • Actual = Expected: ROI expected • Actual < Expected: ROI decrease	• Traffic on Segments 5 and 6 has failed to meet initial projections, and revenue levels have been reported as more than 60 percent below original forecasts. • In 2014, SH 130 had 16,400 transactions per day which was still 30% below initial projections and more than 60 percent below original forecasts. • $69.9 million in projected toll revenues whereas $18.355 million was the actual toll revenue for 2013	↓	**Revenue & Operations**	• (Build America Bureau 2015b) • (USDOT 2016) • (Prozzi et al. 2009)
			Equity invested or divested	• Divested equity suggests meeting ROI • Invested equity suggests covering revenue shortfalls	• The Project has fully drawn its $35 million liquidity facility • March 2016 Operator and TIFIA borrower, SH 130 Concession Company, LLC, applied for reorganization under Chapter 11 of the U.S. Bankruptcy Code. • On June 28, 2017, the Chapter 11 Plan of Reorganization became effective and the project emerged from bankruptcy	↓		• Garvin (2019) • (Winkle 2019) • (Wilson 2017)
	Producer		Compliance with standards	• No sanctions or penalties indicates compliance	• That designer and builder was known as Central Texas Highway Constructors (CTHC).	↓		• (Barr 2018b)

Stages/Phases	Stakeholder	Key interest and expectations	Performance indicators	Interpretation	Observations/Measurement	Interest	Performance dimension	Sources for Observations
		Asset performance/Operation effectiveness			• CTHC knew there were problems with the highway's construction before the paving was finished. The problems were "facility-wide" and causing defects in the pavement that included "pavement cracking" and "heaving,"			
			No increased oversight by the State	• Increased oversight suggests consistent non-compliance	• Moderate increase of oversight on the new owner. • There has been an increased oversight while transferring the concession to the new company. – Partially met	↔		• Interview
	User	Adds expected value	User patronage and quality	• Usage level indicates fulfills purpose and/or user satisfaction. • Indicators of asset purpose being met (trip time reliability, etc.)	• Cost to use SH 130 (5&6) costs an additional $27.84 to use compared to IH 35 travelling through Austin. • Need to travel an extra 11.6 miles. (2013v52n1_05_TexasTollRoads.pdf)	↓	**Project Impact**	• (Geiselbrecht et al. 2015) • (Bari et al. 2015)
			• Increase of job creation, • Increase of commercial development.	• More jobs (short or long-term) as consequence of project benefits community • More commercial development as consequence of project benefits community	• Partial met	↔		• (Thompson 2020)