

Producing satisfactory outcomes in the implementation phase of PPP infrastructure projects: A fuzzy set qualitative comparative analysis of 27 road constructions in the Netherlands☆☆☆



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Abstract

An understudied aspect for the successful completion of PPP infrastructure projects is the extent to which they are satisfactorily implemented. Studying PPP implementation is important though, because well-planned projects can fail if project implementation is inadequately managed. This article aims to find out which management and public–private cooperation approaches produce satisfaction for public procurers in the implementation phase of different kinds of infrastructure projects. To this purpose, twenty-seven Dutch road construction projects are systematically analyzed with fuzzy set qualitative comparative analysis (fsQCA). The results show four configurations that produce satisfaction. It is concluded that externally-oriented management, which is characterized by a stakeholder-oriented project implementation approach, and close public–private cooperation, where public and private partners work together closely and interactively, are important for achieving satisfaction. In less complex projects with narrower scopes, however, the partners may rely on less interactive forms of cooperation, more characterized by monitoring contract compliance.

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1. Introduction

Current government policies require that projects are implemented in Public–Private Partnerships (PPPs), using innovative contract types such as Design, Build, Finance, and Maintain (DBFM), with minimal impact on the environment (in terms of, e.g., noise nuisance and road availability) and maximum quality, and for as low as possible budgets. Rijkswaterstaat, the major public procurer of transportation infrastructure in the Netherlands,

is a case in point (Rijkswaterstaat, 2014). It has a “the market unless” policy, wants to double its number of DBFM projects by 2020, aspires being a “public-oriented network manager” (Metze, 2010), and wants to attain the same or higher levels of production (road construction and maintenance) with smaller budgets (Rijkswaterstaat, 2011). Such demands require careful project planning. Many studies have hence been conducted into PPP project planning, focusing especially on issues of procurement, tendering, risk allocation, and PPP finance (see Ke et al., 2009; Kwak et al., 2009; Tang et al., 2010).

However, the implementation (i.e., construction and delivery) of PPP projects is complex (cf. Baccarini, 1996; Bertelsen, 2003), involving many stakeholders with different and sometimes unforeseen changing interests, a multitude of regulatory frameworks and restrictions, and complex and sometimes unplanned physical and technical situations (De Bruijn and Leijten, 2008; Hertogh and Westerveld, 2010; Teisman et al., 2009; Verweij and

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Gerrits, 2015). It means that projects can be well-planned and prepared, but that sound plans and good intentions in planning can nevertheless fail in implementation (e.g., Pressman and Wildavsky, 1973/1984). A striking example concerns a €2.2 billion Dutch PPP project for the reconstruction of a 37 km highway corridor, where the obtained gains in the planning, procurement, and contracting of the project are being lost in the current implementation; newspapers reported budget overruns of €250 million and increasing due to, inter alia, external project stakeholder complexity (see Verweij, 2015b). It is therefore important to study how infrastructure projects can be successfully implemented. PPP implementation, however, is a relatively under-researched topic in the literature. Research on PPPs in construction focusses instead on planning and pre-contract issues (Jones and Noble, 2008; Weihe, 2008). One reason for this dearth may be that, whereas the planning of projects is increasingly characterized by open and participatory management approaches, in implementation the project organizations are more closed systems focused on getting the project efficiently and effectively implemented (cf. Dimitriou et al., 2013). This complicates access to projects. Relatedly, implementation data are often not made available as fears exist that analyses will lead to the identification of culprits for poor outcomes (see Verweij, 2015b).

In response to this research gap, recent case study research has been performed (e.g., Verweij, 2015a; Verweij and Gerrits, 2015), stressing the importance of externally-oriented management approaches and close and informal public–private cooperation for PPP infrastructure project implementation. Such case studies can provide valuable in-depth insights into managing the complexity of project implementation (cf. Blomquist et al., 2010; Cicmil et al., 2006). However, infrastructure projects are no one size fits all; e.g., a DBFM contract may require different cooperation and management orientations than a Design and Construct (D&C) contract. It means that case study findings are hard to generalize, exactly because they emphasize the complexity of the infrastructure projects (Verweij and Gerrits, 2013). What is hence needed is comparative research that can strike a balance between highlighting the unique aspects of projects, as well as the commonalities between them. This article investigates whether different kinds of infrastructure projects – in terms of contract type, project scope, and project size – may be (or need to be) managed differently to have a satisfactory implementation process. To that purpose, it studies a medium-n of project implementations applying fuzzy set qualitative comparative analysis or fsQCA (Ragin, 2008), a methodological approach that was recently proposed for infrastructure project research (Verweij and Gerrits, 2013), that is well-suited for striking a balance between in-depth insights and generalization.

An important issue here is the outcome measure. Infrastructure projects are implemented in complex social environments, which requires a public procurer to take into account more project outcomes than just the iron triangle's measures of cost, time, and quality (Atkinson, 1999; Dimitriou et al., 2013; Jeffares et al., 2013). Infrastructure projects may be completed within time and budget and according to specifications, but public values such as transparency or accountability (e.g., Reynaers, 2014) may have been impaired, the public–private relationship may be strained,

or external project stakeholders' interests (such as those of citizens, municipalities, or businesses) may have been harmed by the project. Such project outcomes relate to the core responsibilities of government served by public procurers. The iron triangle thus does not capture well the complexity of what constitutes a successful project implementation. The concept of 'satisfaction' is better able to capture the variety of outcomes being produced in implementation (cf. Kärnä et al., 2013; Lehtiranta et al., 2012; Verweij, 2015a; Verweij and Gerrits, 2015). In this article, satisfaction is the aggregate measure of eight different implementation outcomes, as further detailed later. The research question is: which management and public–private cooperation approaches produce satisfactory outcomes in the implementation phase of different kinds of infrastructure projects?

The article is further structured as follows. In Section 2, literature and previous research are discussed, explaining and motivating the main concepts of this research which form the framework for the analysis. To answer the research question, twenty-seven Dutch road constructions are analyzed. Section 3 presents and explains the data and the methods used for the analysis. The analysis and results are provided in Section 4. Section 5 comprises the discussion of the results and limitations of the research. Conclusions are drawn in Section 6.

2. Managing infrastructure project implementation

This section describes the main concepts that formed the framework of the research. This study focusses on the question which management and public–private cooperation approaches produce satisfactory outcomes in different kinds of projects. Section 2.1 discusses literature to explain the different management and public–private cooperation approaches, and the satisfaction outcome measure. Section 2.2 focusses on the characteristics by which projects of different kinds can be distinguished: contract type, project scope, and project size. Table 1 provides a brief overview of the elements in the framework, as further detailed below.

2.1. Management, public–private cooperation, and satisfaction

In their research on the management of large infrastructure projects, Edelenbos and Klijn (2009) distinguished between project management and process management (see also De Bruijn et al., 2010; Edelenbos and Teisman, 2008). *Project management* is characterized by a closed, internal project orientation. Indicators are: minimal information is provided to the stakeholder environment about the project's progress, the emphasis is on making progress by speeding up processes, solutions for problems are sought in the project organization so as to promote the project interest, management persists on achieving pre-determined goals regardless of changing circumstances, and communication to the stakeholder environment takes a DAD-strategy (decide, announce, and defend) (Edelenbos and Klijn, 2009). This internally-oriented approach is often associated with traditional modes of management that emphasize the iron triangle measures of success (Edelenbos and Teisman, 2008). The contrasting *process management* approach embodies

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