

# Effects of project governance structures on the management of risks in major infrastructure projects: A comparative analysis



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Received 31 May 2013; received in revised form 25 September 2013; accepted 3 October 2013  
Available online 18 October 2013

## Abstract

Large infrastructure construction projects are prone to risks. Using desktop review and interviews with stakeholder organizations in two major infrastructure projects (the Yi-wan Railway Construction Project in China and the Northern Gateway Toll Road (NGTR) Project in New Zealand), this study investigated how different project governance structures affect the management of risks. Comparative analysis shows that project governance provides a structured mechanism to identify and address risks as they occur. Despite varied context, two projects relied upon flexible contractual arrangements to leverage risks among project participants. While a centralized, single-agent governance was adopted in the form of Project Management Headquarters (PMH) in Yi-wan Railway project, an alliance governance structure was used in the NGTR project. The former enabled top-down risk allocation whereas the latter encouraged proactive solutions to risk sharing. The research outcomes will inform the decision making among project stakeholders on establishing appropriate project governance arrangements in order to achieve target risk management outcome. By comparing real-time projects of varied scope, complexity and significance, the findings contribute to an improved understanding of the relationship between project organizations and project risk management.

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**Keywords:** Project governance; Risk management; Infrastructure construction projects; Comparative case study

## 1. Introduction

Complexities and uncertainties are endemic in large infrastructure construction projects. The uniqueness and individuality of infrastructure projects, such as construction of a railway network, airport or tunnel, often come from their distinctive social and environmental requirements. Complex interfaces (Osipova and Eriksson, 2013), less prior experience (Tang et al., 2006), along with varieties of stakeholders (Olander and Landin, 2005) can add more difficulties to managing risks on these projects.

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Over the past decade, considerable effort has been put into developing various methods, tools, standards and processes for dealing with project risks (e.g. Baccarini and Archer, 2001; Chapman and Ward, 2003; Del Cano and De la Cruz, 2002; ISO, 2009; OGC, 2007; PMI, 2009). The basic rationale underlying many of these techniques is the integration of risk management into a structured process to solve uncertainties and complexities faced by the project team. Turner (2009, p. 209) highlighted that the essence of project management is risk management. Such a viewpoint treats project risk management as a central approach to increasing the chance of project success.

By introducing a ‘dynamic’ concept, some emergent research, including joint risk management (Doloi, 2009; Rahman and Kumaraswamy, 2004) and risk formation mechanisms (Xiang et al., 2012), has advanced risk management theories in the context of construction projects. In recent

years, a relationship-oriented perspective on risk management, especially in large infrastructure projects, has been advocated (Tsamboulas et al., 2013; Ward and Chapman, 2008). The research focus in project risk management has largely shifted from identifying new risks to investigating the factors that might lead to different risk management outcomes.

A mechanism of risk sharing and transfer has been favored in practice and widely used on many large civic construction projects. For instance, relational contracting (Rahman and Kumaraswamy, 2004) and integrated project organizations (Wood and Ellis, 2005) were two methods commonly used to mitigate risks across stakeholders. De Man and Roijakkers (2009) examined how the governance structure of alliances in the construction sector could balance control and trust in dealing with risks. Osipova and Eriksson (2011a,b) empirically explored the effects of cooperative procurement on the management of risks in construction projects. In their recent paper, Osipova and Eriksson (2013) encouraged academics and practitioners to reflect further on how to combine different management systems to achieve successful joint risk management.

Despite the above achievements in project risk management research, there is still a lack of in-depth case studies, including studies of processes and studies of real-time projects, that can increase the understanding about risk management in large infrastructure projects. There is a dearth of studies that examine how different governance structures influence the risk management process and thus achieve differing outcomes. The research reported in this paper seeks to bridge this gap by empirically investigating and comparing the effects of different governing structures on the management of risks in two major infrastructure projects. To achieve this goal, two research questions were formulated.

- 1) How do different governance structures affect the management of risks in large infrastructure projects?
- 2) What key elements within their project governance structure make the outcomes of risk management differ?

The paper begins by presenting an overview of the governance theory in project management, followed by a review of key elements of risk management in large construction projects. A case study method and comparative analysis will be presented in the *Research method* section. Two large infrastructure projects in different contexts, the Yi-wan Railway Construction Project in China and the Northern Gateway Toll Road project in New Zealand, will be presented as case studies of how their governance structure influences the management of project risks. A comparative discussion reveals the reason why the outcomes of risk management in two projects differ. The paper ends with a conclusion and suggests future research directions.

## 2. Literature review

### 2.1. Governance approaches to managing construction projects

Governance theory was originally developed from policy research in political science (e.g. Friedmann, 1980; Krieger, 1971; Nachmias and Greer, 1982). It has nowadays outgrown its initial context and has been applied in different industries,

including the construction sector (Howes, 2000; Pryke, 2005; Reve and Levitt, 1984). As firms in the construction industry are largely project-based organizations, the governance application can be divided into two interrelated dimensions: corporate governance and project governance.

Corporate governance has been treated as synonymous with the good and transparent management of firms and institutions. Müller (2009) argued that the aim of project governance is the consistent and predictable delivery of project's planned contribution to the portfolio and thereby to the achievement of corporate strategic objectives within a corporate governance framework. Garland (2009) reinforced this point by emphasizing that project governance is, or should be, established to fulfill one primary objective: to enable efficient and effective project decision-making. Project governance provides a structure or a framework that articulates the objectives of the project, the means of attaining those objectives and the means of monitoring performance (Turner, 2009).

There is a considerable variation in the ways construction projects are organized. Williamson (1975) initiated the pioneer work and compared market governance with organizational governance by using transaction cost analysis. Reve and Levitt (1984) analyzed the ways of using construction contracts to govern construction transactions. However, the range of governance options open to any firm is limited by the institutional context within which it trades (Winch, 2001). This led to a discussion of embedding organizational and environmental elements in a contracting relation when selecting project governance forms.

Transaction cost economics described four alternative feasible forms of organizations, namely firms, markets, hybrids and bureaus (Williamson, 1996). In construction projects, Reve and Levitt (1984) defined a principal–agent relationship as a professional relationship between the client and the third party consultant to manage construction works taken by contractors. This principal–agent relationship was regarded by Turner and Müller (2004) as the key in forming an effective governance structure.

The problems associated with the principal–agent relationship, however, include the adverse selection problem and the moral hazard problem (Turner, 2009). Over the past decade, a variety of approaches has been developed to address these problems. Control, flexibility and trust are three basic mechanisms that can be built into the project governance design to eliminate uncertainty and complexity in both organizational and environmental contexts (de Man and Roijakkers, 2009; Osipova and Eriksson, 2013).

Shiferaw et al. (2012) exemplified project governance systems that are established by governments to improve the performance of public investment projects. These systems include such as the Gateway Review Process (Office of Government Commerce, UK), the Norwegian Quality Assurance System and the Dutch MIRT Rules of the Game. In recent years, an alliance delivery model for governing large infrastructure projects has been widely applied in countries such as Australia (Manley, 2002; Rowlinson et al., 2006) and New Zealand (State Services Commission, 2012). In spite of different projects and procedures,

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