



# Sustainable project management through project control in infrastructure projects

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Received 1 March 2016; received in revised form 9 February 2017; accepted 9 February 2017  
Available online xxx

## Abstract

Sustainability is becoming increasingly important in the delivery of projects as stakeholders require ethicality, eco-friendliness, and economic efficiency during a project's life cycle. Previous studies focused on the environmental aspects of sustainability in project deliverables, whereas less attention has been directed at sustainable project management during project delivery. The goal of this study is to identify the control practices that a project organization uses for sustainable project management. A qualitative single-case study was conducted on a large infrastructure project in which a road tunnel was constructed in a highly demanding environment, involving multiple stakeholders in an alliance contract. The results reveal that sustainable project management is implemented using not only indicators but a holistic control package in which control mechanisms are used differently for different sustainability dimensions. Internal project control is complemented with sustainable project governance, linking the project to its external stakeholders and regulations. The alliance contract activates the partners to exploit innovation opportunities and, thus, promotes economic, environmental, and social sustainability.

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*Keywords:* Sustainability; Project control; Sustainability indicators; Sustainable project management; Public–private partnership (PPP); Alliance

## Executive summary

Sustainability is an important project goal complementing other aspects of value and benefits. Sustainability is commonly understood through its three components, often referred to as the triple bottom line (economic, environmental and social sustainability). In project business, the sustainability of the deliverable and the sustainability of the delivery process are both very important as they can have remarkable social and environmental impacts. Sustainable project management is particularly relevant for infrastructure projects that cause enduring changes in the community and involve multiple stakeholders with varying expectations. Project control is used to make sure that the goals of the project are met, but so far it has been covered in connection with sustainability only in

terms of performance indicators. There is a need for knowledge on the use of more versatile approaches to sustainability-oriented project control in infrastructure projects.

This paper explores sustainable project management through project control especially in the project execution phase of an infrastructure project. The focus is on how the project organization implements sustainability during project execution, and how project control is used for sustainable project management, both in terms of control mechanisms and the alliance contract of the project partners. A single case study was implemented concerning the construction of a road tunnel in the middle of a city, and it was chosen because of its publicity, accessibility, complexity and demanding conditions. Document data and in-depth interviews were used as sources of data.

The case study revealed that the alliance model was experienced as an enabler for sustainability as it made the cooperation between the customer, contractor and owner easy, and promoted risk and benefit sharing. Joint planning and the

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shared incentive model promoted innovations for reaching sustainability goals, stakeholders' fluent cooperation, and sustainable practices. Planning took place both outside (through local, regional and legal requirements) and inside the project organization, and plans at different levels guided sustainable project management. Performance indicators and monitoring were used for implementing and following up sustainability, but somewhat differently for each sustainability dimension. Some further control mechanisms were identified, specifically for each sustainability dimension. Implementing sustainability goals by adding them to the existing project control mechanisms was preferred over adding new ways of sustainability specific control.

This study contributes to research on sustainable project management in three main ways. It shows through the infrastructure project example the dependencies between sustainability dimensions and the benefits of an alliance contract in enabling and driving balanced sustainable practice. It reveals the use of a control package in managing sustainability during project execution and, thereby, offers new knowledge that complements previous indicator and monitoring-centric research on sustainability-oriented project control. In particular, the results show a special configuration of control mechanisms for each of the dimensions of sustainability and the division into internal and external control mechanisms. Finally, when revealing the centrality of external control through regulations and the alliance contract, the study draws attention to sustainable project governance as a prospective new research avenue in the implementation and control for sustainability.

## 1. Introduction

Projects may succeed and fail in terms of how they reach their goals and how they are managed (Lehtonen and Martinsuo, 2006). The achievement of project goals requires efficient project control (Nieminen and Lehtonen, 2008). Recently, companies and researchers have become increasingly concerned with sustainability as a project goal and as a characteristic of the process through which the project is managed (Gareis et al., 2013; Silvius and Schipper, 2014). Although much research attention has been directed at sustainability-oriented performance indicators and assessment, less is known about sustainable project management, that is, the practices through which projects are controlled to ensure the achievement of their sustainability goals. This study explores the use of project control in sustainable project management in an infrastructure delivery project.

There is no widely agreed on definition for sustainability or sustainable project management (Aarseth et al., in press). Most of the literature builds on the Brundtland Commission's definition of sustainable development: "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (World Commission on Environment and Development, WCED, 1987). Despite the high number of different definitions (over 100 according to Aarseth et al., in press), there is a common agreement that sustainability can be divided into three individual, but interlinked and equally important, dimensions: economic, social, and environmental sustainability (Elkington,

1997, e.g., 1994). This so-called triple bottom-line approach (e.g. Silvius and Schipper, 2014) encourages treating environmental and social issues in the same way as economic aspects when doing business.

One potential area for practical implementation of sustainability is sustainable project management. In project management, attention is clearly moving from immediate project goals to broader business benefits (Atkinson, 1999; Shenhar et al., 2001) and dimensions of value that are more versatile (Martinsuo and Killen, 2014). Companies need ways to incorporate sustainability into project management processes and shift from focusing on the iron triangle of cost, time, and quality to broader impacts (e.g. Silvius and Schipper, 2014). Acknowledging sustainability is extremely important in delivery projects where the deliverables and processes may have a substantial impact environmentally and socially. It is not enough for the company to evaluate the sustainability of the project deliverable, but the project delivery process has to be sustainable as well.

In the present study, in line with Silvius and Schipper (2014, p. 79), we focus on sustainable project management in terms of the practices of "ensuring profitable, fair, transparent, safe, ethical and environmentally friendly project delivery - aiming at a project deliverable that is socially and environmentally acceptable throughout its lifecycle." As the definition points out, sustainability in projects can be viewed from two perspectives: the sustainability of the project delivery (i.e., the process) and the sustainability of the project deliverable (i.e., the product; e.g. Gareis et al., 2013). The focus of this study is the sustainability of the project delivery. Often, the process and product aspects of sustainability are highly interconnected.

Taking into account the three dimensions of sustainability (the triple bottom-line approach) and the two perspectives (the project delivery and the project deliverable), we study sustainable project management in the context of infrastructure delivery projects that offer value to their customers over a long period of time and involve many stakeholders (Kolltveit et al., 2004; Smyth and Edkins, 2007). Infrastructure projects are typical examples of large complex projects that involve diverse stakeholders and require collaboration between public and private sectors (van Marrewijk et al., 2008; Walker and Jacobsson, 2014). They are typically carried out in public-private partnerships where public sector organizations are the investors and the projects are delivered by private sector companies or consortia. Alliance contracts have received growing research interest in public-private partnerships and they have been proposed as beneficial for sustainability in project deliveries, but more research has been called for (Walker et al., 2015). Sustainability plays a central role in the stakeholders' expectations for infrastructure delivery projects, and fulfilling these expectations during project execution is vital. The implementation phase may cause stress to the surrounding social community and environment and pose a risk of accidents to the operational workforce, for example.

Sustainability can be managed in various ways throughout the delivery of the project (Aarseth et al., in press). The early phases of the project are critical for defining the total value generated by the project and putting innovations in place

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