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Exploring mechanisms underlying lock-in in large infrastructure projects: A management perspective

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Abstract

Research in large scale infrastructure projects have argued that the overall project performance is subject to lock-in, yet this is little understood empirically and more research is needed. Recently studies reported that lock-in can occur both at the decision-making level and at the project execution level respectively. The underlying patterns influencing project scope transformation, due to evolving expectations and/or stakeholder's perspective and the occurrence of lock-in influence in project performance. This paper explores the relationship between project scope and lock-in within large infrastructure projects in the context of cost over-run. Based on empirical data from 20 High Speed Rail (HSR) projects in Spain with multinational sets of actors, and anchored in the Management of Project (MoP) paradigm, the paper shows that a holistic perspective is essential for successful outcome. Methodologically, the paper uses data mining and a case study approach to explore mechanisms that underlie lock-in in relation with scope demarcation – tracked through contract change. It suggests that an investigation of lock-in in relationship to scope demarcation and through the lens of path dependence contributes to the understanding of cost over-run emergence. Preliminary findings highlight contract type and its content to have a great influence in cost over-run.

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1. Introduction

Large infrastructure projects such as public high-speed rail project is often a multidisciplinary endeavour where people from different professional backgrounds, e.g. engineers, technicians, economics, politics/ law and sociologists are brought together to engage in a positive outcome in terms of budgeting, time implementation etc. Large infrastructure projects, public or private, are highly risky [1], involve large investments, are characterized by long-term planning, with predetermined budget and time constraints. Too often, project scope or stakeholders' expectations change significantly over time [2] due to inaccuracies regarding costs and schedules (see e.g. [3–5]).
The potential existence of any relation between scope demarcation - timing of contractual changes, lock-in and its influence on cost overrun is an area with growing interest but which lacks empirical support. This empirical research deficiency is subject of difficult access to data, prone of poor project track record, including scattered data and due to bureaucracy and isolation of public entities and actors involved [6].

The extant literature refers to lock-in as the process of escalating commitment [7]. It is defined as "the over-commitment of parties to an inefficient project before the formal decision to build and to the inefficient specification of project after the formal decision to build has been made" [8]. Scope management, on the other hand, is fundamental in providing reliable cost and schedule programming [9], thus facilitating decision making and accountability throughout project life-span. Lock-in has been researched applying different lenses e.g. technical, political, economic and psychological yet the majority of studies are one-sided focusing on the front-end or down-stream execution without taking a holistic approach [10].

This paper presents a theoretically grounded view and argues in favor of complementarity between theories applied to the research investigating lock-in. A framework is designed based on current literature underpinning both the front-end decision making and down-stream execution – advocating a holistic approach. Recently [8] in contrast to previous position of [11] and [3], researchers argue that the concept of lock-in can be better understood from a holistic approach. While equipping this holistic perspective we aim at exploring the multifaceted context in large infrastructure project shaped by innovation, technology, complexity, pace, risk and significant uncertainties [5,12,13]. Beyond understanding we aim at promoting a balance between operational uncertainty and contextual uncertainty; to the date the dominant stream is concerned with the former – operational uncertainty: to have a clear goal and a structured technical design on how to reach it, hence isolating the project from the environment [14,15]. Why? Because goal oriented and a breakdown structure to be followed simply speaks to the logic of mankind [16,17] .

This paper attempts to answer the following interrelated questions: 1) To what extent can the transformation of project scope demarcation influence lock-in? and 2) What are some of the tensions and dynamics when lock-in occurs at the decision-making level or down-stream execution level? Anchored in the project management literature with foci in project 'actuality' [18,19], the paper adopts the 'Management of Project' (MoP) paradigm rather than project management only as execution management [20], the paper shows that a holistic perspective is essential for successful outcome. Before diving into detailed analysis searching for relationships, it is important to define cost overrun, i.e. what are the reference parameters in providing results [21]. This is due to a lack of standard definition leading to inappropriate over-run variations, hence interpreting inaccurately for the same project sample. We argue this variation is closely related to the research stream focus, e.g. front-end decision making or down-stream execution.

The paper applies an extensive research method based on two phases, analyzing the same subject thus enabling data triangulation; i.e. study sample across two phases represent the same projects. To address the first question, a literature review was conducted and data mining was used - in tracking the scope transformation via contract demarcation through data reports and its influence or relationship to lock-in emergence. In addition, an in-depth case study method is proposed deriving empirical evidence in addressing the second research question.