

Lean in the Public Sector.

Lean en el Sector Público.

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Abstract

The Architectural, Engineering, and Construction Industry (AEC) is a critical socio-economic activity that is responsible for 8% of the GDP in the world, in parallel, it also is responsible for the generation of 100 million jobs worldwide. In this context, the generation of value is driven by the execution of capital projects. Nonetheless, despite its importance, the sector's productivity historically is behind other industries, and poor performance of projects is often the norm rather than the exception. The running of projects in the Public Sector is not immune to these issues. An effective strategy to address this condition is the use of the Lean approach.

Thus, this special issue of the Revista de Ingeniería de Construcción is focused on providing insight into the application of Lean in the Public Sector (LIPS). Articles evidencing the results of LIPS in the United States, UK, Finland, and Chile are presented as part of this effort. Following this premise, the authors who contribute to this special issue have provided an inspiring insight into the use of LIPS around the world evidencing the potential of its outcomes. Despite the progress and the encouraging results, much work is still required to widespread the benefits of this approach.

Keywords: *Lean management; Lean in the Public Sector, Integrated Project Delivery, Relational Contracts*

Resumen

La Industria de Arquitectura, Ingeniería y Construcción (AIC) es una actividad socioeconómica crítica que representa el 8% del PIB generado a nivel mundial y, al mismo tiempo, es responsable de la generación de 100 millones de empleos en todo el mundo. La generación de valor en esta industria está impulsada por la ejecución de proyectos de capital. Sin embargo, a pesar de su importancia, la productividad del sector históricamente está rezagada con respecto a otras industrias, donde el mal desempeño de los proyectos a menudo es la norma antes que la excepción. La gestión de proyectos en el Sector Público no está exenta de estos problemas. Una estrategia efectiva para abordar esta condición es el uso del enfoque Lean.

Por lo tanto, este número especial de la Revista de Ingeniería de Construcción se enfoca en proporcionar información sobre la aplicación de Lean en el Sector Público (LIPS, por sus siglas en inglés). Como parte de este esfuerzo, se presentan artículos que evidencian los resultados de LIPS en Estados Unidos, Reino Unido, Finlandia y Chile. Siguiendo esta premisa, los autores que contribuyen a este número especial han proporcionado una perspectiva inspiradora sobre el uso de LIPS en todo el mundo, evidenciando el potencial de sus resultados. A pesar del progreso y los resultados alentadores, aún se requiere mucho trabajo para difundir los beneficios de este enfoque.

Palabras clave: *Gestión Lean, Lean en el Sector Público, Gestión Integrada de Proyectos, Contratos Relacionales*

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1. Introduction

The Architectural, Engineering, and Construction Industry (AEC) plays a crucial role in society. As an economic activity, AEC accounts for 8% of the GDP generated globally, it provides around 100 million jobs worldwide (Flyvbjerg, 2014). AEC is a sector where value generation is driven by the execution of capital projects, which in turn, are executed throughout a complex supply web that involves, owners, contractors, trade contractors, and suppliers, among other actors. This 'ecosystem' exhibits several features, such as its intensive use of labor and capital, inherent high levels of risk and uncertainty, safety, environmental, and quality issues, low technological development, a fragmented structure full of adversarial relationships, and exposure to environmental conditions, among many other particular characteristics (National Research Council, 2009). In addition, the sector currently is exposed to a volatile, complex, uncertain, and ambiguous milieu, caused by socioeconomic, political, environmental, and technological changes, which are generating evolutionary forces that stress the AEC system (Mack & Khare, 2015). Nonetheless, despite its importance, the productivity of this sector historically lags other industries, and poor performance of projects is often the norm rather than the exception. For instance, a study of 258 infrastructure private and public projects, worth US\$90 billion, found persistent cost overruns ranging between 20% and 45%. These outcomes, in turn, were related to the duration of the project implementation (Flyvbjerg et al., 2002, 2003, 2004).

The needs of the Public Sector regarding infrastructure and construction services are not immune to the complex features of the AEC industry. In this context, one of the first and most important steps to address this condition is the use of a Lean strategy. The application of Lean in the Public Sector (LIPS) provides a brilliant opportunity to generate value and eliminate waste, driven by more productive use of scarce resources often available to governments. Following this premise, the authors who contribute to this special issue have provided an inspiring insight into the use of LIPS around the world evidencing the potential of its outcomes. In this regard, this work addresses the experience in the US, UK, Finland, and Chile regarding this fascinating application of the Lean approach.

First, Glenn Ballard sets the context, by providing an agile overview of the origins and development of LIPS, starting with the efforts on relational contracts by the Lean Construction Institute in California. An effort that progressively, through collaboration, helped sectors such as transportation, education, and healthcare, to reduce the duration of projects and drive changes in policy and legislation. An experience that later moved abroad, to Germany and Finland, where successful pilot cases were carried out. After 15 years, LIPS has expanded beyond construction and is a topic of interest in countries like Australia, Chile, Denmark, Finland, Germany, India, Spain, the United Kingdom, and the United States.

In "Lean Project Delivery in the United States Public Sector – history and Current State", David Umstot describes how public agencies in the US have sought improved project outcomes by exploring non-traditional capital project delivery methods since the late 2000s. They employ design-build contracts, emphasizing collaboration, Lean principles, and value creation. He highlights successful cases from four agencies, sharing insights on fostering collaboration, Lean integration, and delivering enhanced value.

Patricia Tillman in "Key Lessons Learned from Adopting Relational Principles in the Public Sector – A Case Study in California" addresses the case of the US public sector, where collaborative project delivery methods, reflecting relational contracting, are gaining traction. Despite the proven benefits of this approach, much is still unknown, thus she aims to help bridge this gap by discussing key relational elements drawn from literature and an empirical California case study. Despite challenges, the effort shows the efficacy of the lean approach in the public sector, offering insights for wider adoption and inspiring industry collaboration.

Then, Abdel-Azim Amr in "Lean/IPD in action – MSU business college pavilion case study" describes some key insights on the application of IPD at the Michigan State University (MSU), during the successful construction of its Business College Pavilion. In this context, he addresses the use of tools like the IPD agreement, Lean Execution Plan, and Target Cost to achieve this outcome.

Next, in "Developing a New Procurement Model, Using Behavioural Economics, to Enable Continuous Improvement of Productivity and Better Value in Large UK Infrastructure Projects", Martin Perks provides a very interesting review of the development of a new procurement model for higher productivity. Highways England's Regional Delivery Partnerships serve as a prototype, employing nudges and loss aversion to enhance innovation, eradicate waste, and incentivize efficiency, providing a template for similar infrastructure projects.

In "Lean in the Public Sector in Finland", Pekka Petäjäniemi documents the transformation of the real estate and construction sectors in that country. An effort where, since 2011, Integrated Project Delivery (IPD) has played a crucial role

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in the launching of nearly 100 projects totaling 7.3 billion euros. IPD principles are reshaping work culture, emphasizing cooperation and continuous improvement. This approach has driven collaboration among contracting authorities and service providers, leading to better planning, accurate budgeting, and successful adherence to schedules, showcasing the effectiveness of IPD and Lean principles in Finland's construction industry.

Lauri Merikaillio in “The Lean Journey of the Finnish Real Estate”, provides further light on this country's experience. The Finnish construction industry's embrace of Lean and Integrated Project Delivery (IPD) stems from practical learning through pilot projects by public owners. Over 100 IPD projects and academic studies have fostered teamwork and knowledge sharing. Lean principles led to significant benefits like cost savings, improved quality, schedules, and collaboration, shaping Finland's construction sector strategies.

Next in “Lean Methodologies and Productivity in Mining Development – A Case in a Public Company”, Luis F. Alarcon et al. provide an insight into the experience of CODELCO, the world's leading copper producer, and its efforts in implementing Lean Management into its operations. This work provides an evaluation of Lean methods like The Last Planner® System (LPS) in an underground mining project revealing significant positive impacts: improved indicators, reduced variance, the correlation between planning and execution, minimized delays, and enhanced organizational attributes, an outcome which suggests that a broader industry implementation of Lean in mining.

Finally, Juan Rojas in “How to Implement Lean in a Public Company in Chile and not Fail in the Attempt”, provides the owner insight into the model and methodology developed by CODELCO to implement its Lean Journey. Chile, the top global copper producer, faced challenges in 2015 due to market price fluctuations. CODELCO, contributing 10% of the world's copper, responded by adopting a Lean methodology for continuous improvement. Their work culminated in the development of the C+ system, an effort that gained recognition from the Shingo Institute in 2023.

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