

Opportunities in Civil Projects with Artificial Intelligence

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Abstract

To analyse and compare different production methods, innovative designs and sustainability are essential keys in civil projects. A promising approach is to combine automated design methods supported by artificial intelligence (AI). The purpose of this study was to identify and describe knowledge gaps in this field and necessary method development. A series of interviews were performed with experienced personnel from the construction business in order to point out how evaluation of alternatives in today's tender processes are performed. Furthermore, a literature review was carried out to determine the possibilities with AI. It can be concluded that requirement documents, and information management need to improve. Furthermore, several methods for multi-objective constrained optimization exists today. If this is combined with a set-based parametric design approach, contractors could increase their ability in finding opportunities.

Keywords: Digitalization; artificial intelligence; multi-objective optimization; automation.

1 Introduction

The EU-commission adapted a climate goal for a sustainable future, where all member states should be climate neutral by 2050 [1]. The concept of sustainability of today encompasses three categories: economic, environmental; social. Civil projects have a large impact on all these categories and will require extensive adjustments in order to successfully meet this growing demand, especially since the number of infrastructure project is expected to increase in forthcoming years [2]. To address more objectives than lowest price during

design, is relatively rare. Sustainability performance is considered important during infrastructure project, although it most often comes down to overall cost, when decisions are made. A holistic view of sustainability should be adapted, where several objectives are optimized, to find a neat trade-off, when objectives are conflicting. In addition, client requirements are extensive and difficult to overview, hence enforcing constraints to contractor solutions which need careful consideration. Infrastructure projects need an increasing sustainability performance and methods to quantify and automate this process are essential for success.