UNIVERSITY OF CAMBRIDGE
Department of Engineering

CONSTRUCTION ENGINEERING MASTERS DISSERTATION ABSTRACT

The Client's Problem Space, Construction, and Artificial Intelligence

Two problems have been identified for construction clients: expressing what they want and getting this delivered. Most construction-related research and solutions focus on improving the performance of the industry rather than improving client understanding. However, it can be challenging for clients to express their needs in a highly complex and contextual industry, where benchmarking and biases can impose false assumptions early on. This dissertation focuses on clients' behavioural and decision-making aspects and the phase before the decision to construct is made. Clients make or overlook important value judgments in this early discovery phase, impacting the project's success. Particular attention is given to the potential role of artificial intelligence, which brings new opportunities in decision-making.

The research question is: What potential role can artificial intelligence play in supporting better client decision-making before the construction process begins? The objective is to explore the Client-Construction-AI area with industry experts, seek a deeper understanding and find detailed questions and recommendations for subsequent research and solution development. The aim is to enable clients to explore and evaluate their problem space and enhance data-driven approaches when determining construction needs and outcomes. EMK complexity methodology was used, conducting semi-structured interviews for data collection and a Reflect Back workshop to deepen the analysis.

The research found two areas where AI could participate in decision-making, Client exploration & AI and Client communication & AI, along with a third foundational category, Data & Data governance. A decision flow analysis between clients and construction was developed to outline the limits of collaboration and the opportunities for AI. Client exploration & AI expanded on metrics beyond traditional cost and time to include softer, behavioural targets, supported with rapid prototyping. Client communication & AI can enhance understanding between different industries reducing biases using natural language processing. Data & Data governance outlines data fragmentation, ownership, and interoperability challenges, highlighting the need for national data interests. These results show numerous ways to improve how clients can evaluate their needs and decision implications, improve expression, and enhance the quality and trust of communication. These advancements would address the unhealthy relationship between clients and construction and the quality of our built environment. Further research is needed on detailed solution development and AI-enabled metrics of the future.

Sarah Pirila
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