

CONSTRUCTION ENGINEERING MASTERS DISSERTATION ABSTRACT

Exploring the potential improvement of quality control in the construction industry with the use of digital technology

The construction industry has traditionally relied on paper to manage quality records, which has resulted in data analysis being challenging. To overcome this issue, the industry has started deploying digital-collaboration and field-mobility solutions.

This research was aimed at critiquing the application of digital technologies for the potential improvement of quality management in the construction phase of civil engineering projects.

To address the aim, two objectives emerged. The first was reviewing digital technologies that were available for use in quality control that could assist in the reduction of defects. The second was seeking the viewpoint from construction professionals to develop a quality management framework employing the most applicable digital technologies.

In support of the objectives, a qualitative research approach involved multiple sources of data collection, gained from literature and interviews. Participants in the interviews included digital engineering specialists, designers, main contractors and subcontractors. The data accumulated was analysed from both the answers to direct questions and by coding to provide a quality management framework of the most applicable technologies.

The key findings showed that implementation of digital engineering for quality assurance was at an early stage of development. Applicable digital quality applications were identified as electronic document management systems, personal digital assistants, building information modelling (BIM), mobile construction application products (apps), clash mitigation using BIM, real time performance information, point clouds of as-built construction, three-dimensional vision on mobile phones and barcodes.

Implications for practice indicated that training, visible use of digital technologies on site and the provision of an effective common data environment were paramount in instigating digital applications. Also, academia could assist in providing this common data environment. Once the appropriate technologies, readily available from vendors, were appreciated by company management, the most significant outcome was company willingness at director level for the adoption of digital engineering. The originality and value of this research derived from there being limited studies considering a unified approach, utilising the available digital processes, for quality assurance in the construction phase of civil engineering works.

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