

## **CONSTRUCTION ENGINEERING MASTERS DISSERTATION ABSTRACT**

### **Digital technologies effect on labour productivity in reinforced concrete frame building construction**

Productivity is a fundamental driver to successfully operating countries, companies and construction projects; it is linked to profitability and growth. Construction and the built environment have a major direct impact on the productivity within the wider economy, as the construction industry accounts for

3.1 million jobs or 9% of total employment in the UK. However, productivity in the construction industry has been declining for many years; this contrasts with other industries such as manufacturing.

This is an issue for the industry as it affects profitability of construction businesses, value for money and capital cost of investment for clients. It also has an impact on the economic health of a nation as the government is one of the largest clients in the construction industry, investing in infrastructure such as roads, rail lines, hospitals, and schools. An improvement in productivity in this sector could enable public money to buy more with less, in turn creating more investment in national infrastructure projects. It would also likely drive a more viable business model for contractors in the industry. This research dissertation explores what productivity effects there are when a construction project embraces digital technologies.

An experiment was carried out to measure the impact digital tools can have on productivity on a live construction project. Historical projects were reviewed to establish a baseline for labour productivity on reinforced concrete framed buildings constructed using conventional paper-based methods for conveying information. This was compared with productivity outputs from a concrete frame building project where digital tools were utilised for information transfer. The digitally enabled project was set up using 3D modelling to digitally create a replica of the concrete frame building, including 3D modelling of reinforcement. The labour on site were given iPads to fully utilise the 3D model instead of working from more traditional 2D paper drawings. A comparison of the productivity outputs was carried out to assess the variance between the baseline productivity data, the digitally enabled project, and various trends and discrepancies identified.

The study identified labour productivity across construction projects are inconsistent, but marginal improvements on labour productivity were identified as a result of these digital technologies. These findings were based on only one digital enabled project, and further analysis should be carried out on similar digitally enabled projects to identify if labour productivity can deliver more consistent labour productivity outputs when digital technologies are implemented.

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