

CONSTRUCTION ENGINEERING MASTERS DISSERTATION ABSTRACT

An examination of the site factors which affect modular housing delivery - A UK perspective. A mixed method approach

The UK is facing a chronic housing shortage and industry is unable to deliver the numbers required each year to meet the needs of society. The UK Government has a target to deliver 300,000 new homes each year, but the number delivered each year is barely half this. The problem is compounded by a shortage of skills and a labour model historically aligned to traditional masonry construction.

Low productivity and poor quality have been challenges for the house building sector for decades. More recently, the climate change crisis has highlighted the need to construct high quality, efficient and sustainable housing. The fourth Industrial Revolution with the innovation in new building materials and manufacturing processes enables this aspiration to be delivered. Modular housing provides an opportunity for industry to deliver a precision engineered product.

The benefits of modular housing, include increased speed of delivery, high quality construction, less environmental impact and potential cost savings arising from a reduced construction programme, with groundworks occurring simultaneously with manufacturing. However, many modular developers struggle to achieve the reported benefits. There are numerous barriers to scaling up modular housing delivery, but what is less understood, is the extent to which site factors may impact upon construction programmes. Modular housing requires a standardised approach at every stage of delivery and may be less adaptable during construction, compared to traditional house building.

Using an explanatory sequential mixed method research approach, this research examined the potential site factors which affect modular housing delivery in the UK. The research method used a survey questionnaire to obtain quantitative data to identify the factors which have the greatest impact on site-based construction teams. Semi-structured interviews were undertaken with industry to gain a greater insight of the causal factors and interdependencies that can impact upon construction. The research examined four areas identified as being problematic: planning conditions, site characteristics, logistics and construction activities.

The results identified that planning conditions relating to the extent of customisation, logistical constraints associated with site accessibility, site size, location, and topography can impose unique constraints on site teams constructing modular systems. Significantly, lack of system knowledge and availability of labour were identified as the most problematic factors impacting upon construction interfaces, increasing programme delays and construction costs.

The research identified that site factors although problematic can be largely mitigated through detailed planning, designing for installation and good quality control of construction activities. However, the skills shortage and lack of necessary skills required to deploy modular efficiently, have been identified as a significant constraint to increasing the amount of housing delivered using these systems.

Simon Tucker

October 2022