Editorial

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Rapid technological advancements are changing the global market; increasing competition and driving innovation in civil engineering and related services. This places the industry under increasing pressure to design and construct greener, smarter developments and infrastructure, and to implement projects in a highly competitive market. To do this, companies are required to invest in innovative and smart solutions for increased efficiency and cost optimisation.

This latest edition of the ICE's *Municipal Engineer* brings five publications that are addressing some key strategies to promote greater innovation in the global market. The first three papers make use of computer modelling and simulation to solve engineering issues in the areas of landfill management, transport, and the built environment. The fourth paper address the issues associated with estimation and management of operating expenditure, while the last paper discusses aspects around the improvement of the competitive advantages of construction companies overseas.

Smart technologies

Wang (2018) simulates the generation and recycling rates of municipal solid waste in Hong Kong using system dynamics modelling using Vensim 6.0. Simulation results show that the Hong Kong municipal solid waste generation will increase based on the current population growth rate from 3.437 Mt (in 2013) to 4.962 Mt by 2025, but recycling will also increase from 37% to 40%. Yau (2010) reports that 80% of the Hong Kong population is involved in the waste separation programme thanks to the efforts of the government and community, contributing to the increase of the waste recovery rate. The recycling rates are expected to offset that of the municipal solid waste generation reducing the need for new landfills.

Zhang *et al.* (2018) investigate the pedestrian crossing characteristics at a right-turn lane on a traffic island in China. In this work, Erlang distribution was adopted to simulate the congestion and the randomness of the right-turn traffic flow. Results show that the vehicle numbers and the degree of congestion significantly affect the pedestrian crossing behaviour during saturated and unsaturated flows. It confirms that during saturation periods, there are less opportunities for pedestrians to cross than unsaturated periods and, to solve these issues, the use of signal controls is recommended.

Faltejesek *et al.* (2018) uses building information modelling (BIM) to support decision making for the regeneration of brownfield sites (i.e. buildings that are dilapidated, abandoned and no longer serving their purpose) by identifying in advance the degree of risk, assessment of mitigation measures including the need for rapid intervention. The building model was developed using the BIM software ArchiCAD19 and Autodesk Revit 2018, while simulations of heat transfer, energy consumption, flow of pollution, wind or snow effects, and flood conditions were carried out using the Ansys Fluent software. The paper presents one example of using the BIM model on a selected brownfield, showing the current building condition and the after regeneration.

Cost efficiencies

Blom and Guthrie (2018) investigate – through a review of 128 detailed project documents from the Auckland Transport in New Zealand – how operating expenditure (i.e. 'consequential OPEX') is estimated and managed. They identify a wide range of issues that lead to an underestimation of 'consequential OPEX'. For instance, their study shows that poor management practices can unintentionally lead to budgetary and operational omissions, including service, societal and environmental impacts, as well as increased asset maintenance requirements. A new operational model is proposed to account for short- and long-term OPEX. The paper also brings a challenge to those in finance to develop accounting practice that improves the support to the specific needs of public infrastructure governance and management.

Competitiveness in global markets

Ng *et al.* (2018) applied Porter's diamond framework (Porter, 1990) which captures the major determinants of competitive advantage together with their interactions with each other through stakeholder consultation by interviews and focus group. The authors take Hong Kong as a case study given the fact that it has survived a drastic decline in construction activities after a respiratory syndrome epidemic and the 'financial tsunami' as a result of venturing into the overseas and mainland China markets. Results show that the main reasons for Hong Kong construction enterprises' ability to withstand pressures from both local and global competition related to their professional resources, accumulated experience in designing and constructing high-rise buildings.

The focus on smart construction and digital design, sustainable construction and improved trade performance described in these papers have been identified as three key priority areas identified by the UK Government (HM Government, 2013). Clear targets for the construction industry have been set for 2025, including: (1) 50% reduction in the overall time from inception to completion for new building and refurbished assets, (2) 33% reduction of initial cost of construction and the whole life cost of built assets, and (3) 50% reduction in the trade gap between total exports and total imports for construction products and materials. These requirements for excellence in civil engineering practice, including technical excellence and business impact, are not only for UK firms but worldwide, and call for a strong focus on ongoing research and development and partnerships between businesses and universities/research institutes.

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