Editorial

Oluwale Alfred Olatunji PhD, PGCert HE, B.Tech-Hons, MRICS, RQS, MNIQS, AAIQS, MICRM, MSoCLA
Senior Lecturer, School of Design and the Built Environment, Faculty of Humanities, Curtin University, Perth, WA, Australia

The desire to build bigger, better and faster has remained with our generation. It is the way of the future also. The construction industry must re-invent itself continually along this line of thought in order to keep up with the teeming needs of a fast-growing global population and the emergent pace of innovation from other sectors. This involves advancing the frontiers of new knowledge towards creating cutting-edge solutions that can trigger improved efficiency in how construction projects are designed and built, and managed during operations. Every stakeholder in the construction industry – project owners, financiers, contractors, consultants, workers, policy makers – is challenged to adapt into a new way of thinking in which new knowledge flows seamlessly into practice and teaching, such that actors are able to learn and improve continually and simultaneously. Normative commentators have described this as the way of the future, the future that has truly begun! They are also of the opinion that construction businesses or practitioners who are averse to continual change, or are unable reform their processes by upscaling with new knowledge and techniques continually, are unlikely to remain relevant for much longer (Grübler, 2003). New knowledge comes in the form of new technologies, management methods and operational methodologies. Many scholarly journals publish on these regularly. However, they also publish outcomes that are unrelated to practice, and sometimes they ramble and stagnate their efforts on research problems that are not too important to the commercial reality of present and future research and practice. For example, Ahiaga-Dagbui *et al.* (2015) made a point on this. They concluded that construction management research on some subjects – cost performance in particular – is stagnated, over-researched and has become ineffective for the problems they intended to address. Love and Ahiaga-Dagbui (2018) also articulate how a large of section of project management research has been misled consistently over many years due to bad science. Something must happen to trigger the much-needed change on this.

There are several dimensions to the challenges confronting the construction industry along the lines of upscaling with modern-day knowledge and skills. An important aspect of the solution is that the industry must understand, articulate and advance its new knowledge appropriately from time to time. In the first quarter of 2017, the editorial advisory panel of *Proceedings of the Institution of Civil Engineers – Management, Procurement and Law* announced

a themed issue on ‘Recent advances in construction technology and management’. The purpose of the themed issue is to harness scholarship relating to new aspects of construction research and practice without replicating a conventional train of thought. Papers were invited from areas related to robotics, digital designs, smart materials, autonomous systems, renewable energy systems and zero-carbon dioxide solutions. Developments in these areas present significant legal opportunities and challenges, as well as opportunities and challenges for the procurement and management of design and construction processes.

The themed issue call for papers was a success. Submissions came from virtually every continent on the planet – from Africa, Asia, Australia, Europe and North America. Six papers were accepted, but were published as part of different regular issues; two in volume 170, four in volume 171. They all provide robust narratives about recent advances in technological and management research and practice. The areas for further research suggested by each of the papers are also intriguing.

In particular, Urquhart and Whyte (2017) analysed 27 scholarly articles and interviewed 20 large construction contractors in Australia regarding the value and applications of tender decision tools in practice. They found tender decision tools are not popular amongst Australian contractors. Rather, participants in the research preferred outcomes that focus on efficient tender procedures, objective contract constructs and an improvement in risk-transfer processes. This signifies a crucial change in some readers’ desirability of research outcomes on tender decision-support tools – an area that until recently produced a significant number of world-leading outcomes.

Windapo and Moghayedi (2017) tested the assumption that location determines nuances in prices of construction materials. They found prices are not the same in different locations in South Africa and that some are not significantly different between retailers irrespective of their locations. Their study shows distance between manufacturers and retailers is a weak predictor of prices of construction materials. Geographical information system (GIS) and regression models were used to show that distance is not a key cause of variation in the prices of building materials. Windapo and Moghayedi suggest further studies should consider the descriptors

of distance that shape fluctuations of construction materials' prices. Could it be distance between retailers, or between retailers and project sites, or between retailers and a particular spot in the market, or between undefined random reference points and places where materials are put to use? Further studies will unravel these. In addition, Windapo and Moghayedi's paper shows it is now increasingly possible to add price intelligence to the functionality of GISs for common goods such as energy, food and health, as well as for construction materials such as cement, bitumen, timber and glass.

Lopez and Amara (2018) examined issues encountered by construction practitioners whilst resolving disputes through the dispute board (DB) and standard adjudication (SA) methods. An interesting narrative on the history of DB and SA in Australia is presented in the study. In addition, the authors analysed and compared the two methods of dispute resolution. They were able to elicit barriers to widespread adoption of the two methods. More importantly, the conclusions of the study draw strength from notable recent developments that have weakened the barriers.

Akinyemi *et al.* (2018) noted the difficulties in integrating multidisciplinary data in today's digital designing and design-management platforms – design and construction data exist in different forms and require intensive efforts (and prohibitive costs) to piece together. The authors propose an ontology for data integration using tools that support Semantic Web technologies. Small firms who run on limited information technology (IT) resources and budgets will be able to use the tool to articulate data from heterogeneous sources, conduct quick searches and detailed data-quality checks. The system is also able to store project data.

Känsälä *et al.* (2018) used a cutting-edge machine-learning process to capture rail assets and to measure track condition through a moving train. The system reported in the study is able to detect slight changes in rail conditions. Remote observers were able to obtain the information in real time such that remediations could be initiated quickly, thereby eliminating delays and system degeneration due to deteriorations that are hard to find. The system has been used to capture some national rail assets and their conditions in Finland; it has also been used to measure performance of assets under varying operational and environmental conditions.

The last article of the themed issue on recent advances in construction technology and management, the paper by Kan *et al.* (2018), is included in the current regular issue of the journal. The paper presents a bidirectional system in which an actual site is able to communicate with a virtual system in real time and vice versa. Kan and her colleagues developed the system to plan and monitor the operations of mobile cranes. Other studies have highlighted the central premise of Kan *et al.*'s study, in particular how cyber-physical systems are able to facilitate real-time communication, bidirectional coordination and timely control feedback. However, the edge that Kan *et al.*'s work has over extant studies is in improving safety around mobile crane operations. The model presented in the

study is able to feed information into the system such that crane operators are able to have adequate awareness of their environment in real time. Operators are also assisted by the system's ability to actuate safety actions under pre-defined conditions. The training value of this innovation is inestimable, and so is the potential of future developments in this area. Like in the shipping industry, studies such as Kan *et al.*'s are signalling the increasing possibility of autonomous cranes in the construction industry and control of multiple cranes from a distance away from site and at a single spot.

There are other articles in the current regular issue which are not from the themed issue on recent advances in construction technology and management. They are equally robust and insightful. Umar and Egbu (2018) observe the rising cost of occupational safety and health (OS&H) in Oman. Their study examines the use of construction safety climate in Oman. Their study analysed 62 safety factors sourced from the findings of 13 scholarly publications. Six construction managers were interviewed for triangulation. Findings from the study suggest management commitment, workers' empowerment and involvement, communication and training often have significant impact on safety climate. The authors draw recommendations for further research in this area, including the need to develop effective assessment tools for managing safety climate.

Ghazali *et al.* (2018) premised their study on confusions that ensue when the procurement processes of public-private-partnerships (PPPs) are applied differently in diverse parts of the world. The authors suggest that the different national nuances often complicate research analysis and outcomes regarding benefit realisation of PPP projects. They compared PPP practice in Malaysia and the UK. They found competition is intense in the UK's PPP procurement processes, whilst the Malaysian PPP market is still emerging and does attract an intensive political cost. The study concludes that PPP protocols should not be defined by political actors, but autonomously by the relevant public sector entities who possess absolute authority on their needs.

This issue also includes a briefing article and a book review, which are concise and instructive. The briefing by Davis (2018) alerts readers to a recent change in the scope of clause W1.3(2) of the NEC3 *Engineering and Construction Contract* (NEC3, 2013). The clause bars contractors from referring disputes concerning actions of the project manager to adjudication or a tribunal outside a period of 4 weeks of becoming aware of the action that gave rise to the dispute. Davis points out that adjudicators and judges have expanded the ambit of clause W1.3(2) to include disputes about the product of the project manager's disputed action – this could have otherwise been categorised within clause W1.3(4), being a dispute about 'any other matter' (which is not subject to a time bar).

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