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Construction defects, danger, disruption and disputes: a systemic view of the construction industry post-Grenfell

More than 4 years after the UK Grenfell Tower tragedy in 2017, the ramifications of the failures continue to reverberate across the building industry and policy makers globally. On the 14th of June 2017, flammable cladding on the Grenfell Tower in London caught fire resulting in a catastrophic fire incident with over 70 fatalities and 70 injuries. While the flammable cladding was a critical cause of the safety issues; within a holistic perspective, this is just one symptom of larger systemic problem globally. The Grenfell disaster inquiry is currently uncovering failures in the UK construction industry, such as how construction products are marketed, tested, and regulated. There are similar high-profile construction safety failures emerging from other parts of the world, such as the Milan fire (Italy, 2021), the Padova bridge incident (Italy, 2018), Miami collapse (USA, 2021) and the Opal Tower emergency evacuation (Australia, 2018).

Researchers have used various angles to study safety, including a focus on culture (e.g. Dekker and Breakey 2016); cognitive models and human error (Rasmussen 1987); organizational and technical complexity (Perrow 1984, Sagan 1993); and, process reliability (Weick and Sutcliffe 2006, olde Scholtenhuis and Dorée 2014). When borrowed from other scientific domains, these perspectives introduce relevant concepts and frameworks to study organisational and managerial aspects of construction safety. So far, however, this has not led to many construction management studies that include different organizational levels, connect findings from distinctive disciplines, or reflect on the value of unique and high-profile case studies. Consequently, it may be less surprising that across the wider construction management research community, there had been little acknowledgement that a disaster such as Grenfell was plausible; even despite earlier cladding apartment fires, such as Lacrosse in Melbourne, Australia, in 2014.

Building fire safety research is a minor pursuit within construction management literature. This can be reflected within this journal, since aside from very early work by Shields *et al.* (1990) that explored evaluating fire safety, there has not been any publications directly focusing on building fire safety. This is despite the growing trends of building façade fires, which have risen seven-fold over the last three decades (Bonner and Rein 2018). Since the Grenfell disaster, more academic work on the flammable cladding crisis has begun to emerge. Research has highlighted that a lack of specific fire prevention knowledge in the construction industry remains (Mohamed *et al.* 2020); has discussed the challenges of assessing building

compliance (Hayes 2018, Hills 2018, Law 2021); and has revealed the implications the cladding crisis has had on the homeowners (Martin and Preece 2021, Oswald 2021, Oswald *et al.* 2021a,b).

When discussing the construction industry, *The Hackitt* report, (which followed the Grenfell Disaster) stated: “there is a need for a radical rethink of the whole system and how it works” (Hackitt 2018, p. 5). Hence, there is still further work into systemic construction failures that needs to be undertaken. Globally, there are still significant issues with quality, compliance, and safety within the construction industry that the academic community should more fully engage with to better inform policy and industry change.

Construction management studies should address the broader role of structures and the activities of agents in the building process; and do this not only with a focus on the construction project lifecycle, but also look beyond, at how safety emerges as a dynamic phenomenon. We challenge the construction management academic community to consider how their research could develop a more “systemic view”. For example, by addressing multiple organisational perspectives (e.g. the temporary project, the permanent organization, the industry); looking at the relations and dynamics between construction stakeholders (e.g. clients, contractors, authorities, regulators); and the economic systems of which projects are part (e.g. by looking at policy, standards, and procurement practices).

What is left to be answered is what kinds of research questions, research methods and research objects the systemic view (that we call for) entails. Possible routes towards this could be that the construction management research community borrows more concepts from organisation and safety sciences. For example, reliability principles, frameworks and lessons learnt from the analysis of organisational performance in high-hazard industries (e.g. Weick Sutcliffe 2011) might help reframe and reconceptualise safety. Also practice-turn inspired approaches (Bresnen 2007) may provide methods that allow close empirical analysis of practical phenomena, as part of their embedding institutional context.

We thus push for usage of concepts from other scientific domains, and multiple methods, to conceptualise, abstract and connect the operational, industry and policy levels. Through this special issue, we encourage greater and broader academic focus on systemic construction issues central to what matters in the industry, including defects, danger, disruption, and disputes.

This issue

This issue promotes the need for research studies with a systemic view of the construction industry, following recent high-profile construction failures. We invited discussion on relevant issues related to the current construction climate through an elevated perspective that considers safety and quality more holistically. This encompasses post-incident research, as well as trying to unpack understanding into the dynamics that cause cascading errors. There are three papers that were accepted for publication in this special issue, which are introduced below.

The first paper is titled: “Towards contracting strategy usage for rework in construction projects: A comprehensive review” by Asadi *et al.* (2021). The authors discuss the importance of rework in the construction industry and that failing to deal with rework in the project life cycle will lead to an unsuccessful project delivery. The increasing quality of construction processes is very relevant within a systemic scope on safety, as these processes can also enhance safety performance (Mitropoulos and Cupido 2009). Asadi *et al.*'s (2021) comprehensive review into rework found six study areas: sources of rework, models and solutions, management and strategies, theories and techniques, rework impacts, and factors affecting rework. They highlighted future research directions, including how there is no systemic literature review on rework causes. Hence their call, for a comprehensive review to unify all identified root causes of rework under a comprehensive classification model in the project life cycle.

The second paper within this special issue is titled: “Buildings as complex systems: implications and challenges for safety management and regulation” by Selçuk Çıdık and Phillips (2021). The authors investigated the ongoing regulatory changes to high-risk residential buildings in the United Kingdom following the Grenfell Disaster. Their findings revealed aspects of organisational culture that underpinned the safety-related behaviour in a buildings' life cycle. They demonstrated that aspects of organisation culture meant that regulatory changes failed on their intentions. Their work provides further insight into the challenges for implementing Hackitt's (2018) recommendation of having a 'golden thread' of information. This is where information on the original design intent and subsequent changes are captured, maintained, and used to support safety decisions. Their work also demonstrates exploration into how the industry can move forward and learn from failure, as they consider regulations are a more fluid, multi-interpretable phenomenon that might not achieve what they intended at the project level. They recommend that for greater regulatory success, organisational culture theory should be more deeply considered within policy making.

The third paper within this special issue is titled: “Regulatory Decoupling and the effectiveness of the ISO 9001 Quality Management System in the construction sector in the UK – a case study analysis” by Brooks *et al.* (2021). Across three case organisations, they investigated the extent of regulatory decoupling and its impact on the

effectiveness of implementation of the ISO 9001. Their findings explained how that within the construction sector, there is widespread regulatory decoupling practice in quality management. This was being driven by prevailing company culture, the desire for autonomy amongst site managers, and the operation and support given to audits. Their work builds on previous construction literature into construction quality (see, for example, Bosch and Philips 2003) and provides further understanding into quality, policy, and practice challenges within the industry.

The first paper provided a comprehensive review of rework, highlighting gaps for future studies in construction contracts. While both the second and third studies were able to identify “weak spots” within the complex and dynamic multi-layered organisational systems, that can help the future avoidance of errors and development of socio-technical solutions to prepare for unwanted events.

Where to next?

The papers within this special issue will encourage the construction management research community to further engage with the core practical and theoretical challenges that are systemically engrained within the industry. Quality, safety, and regulation issues have not only recently surfaced from flammable cladding, but with other past construction failings including asbestos, structural failings, widespread leaking buildings and poor sustainability. These re-emerging failures represent deep systemic issues within the way the construction industry works. Such failings are not only physical (e.g. dangerous material) and technical (design fault), but also include institutional arrangements with policy and practice that, in turn, have allowed a range of latent defects to exist or manifest. Complexities in the management, legal arrangements, and industry fragmentation create dynamics that make safety and management of errors an intricate research topic and challenging task for the industry to address.

The construction industry is designing and building more complex structures, as our demand for suitable and sustainable housing in dense cities grows and we transition towards a low carbon future. As the built environment explores new sustainable designs, materials and improved performance outcomes, new innovative products and approaches can also result in safety, quality, and regulatory challenges for the construction industry. For example, the unsafe type of flammable cladding widely used (an aluminium composite panel with a polyethylene core) was originally believed to be an innovative sustainable product since it was light-weight, had good thermal properties, was aesthetic and cost-effective. There have also been a range of other safety and regulatory issues that have emerged; with sustainable initiatives being rapidly implemented, quicker than safety requirements and building regulations have been introduced. For example, the Home Insulation Program (which was developed in 2009 as a GFC stimulus

package in Australia) provides another cautionary tale with the program shut down abruptly after more than 200 house fires and four installer deaths (Moore 2018). A Royal Commission review reflected that the program was hastily developed and lacked appropriate checks, balances, and industry oversight.

The growing urban built environment also creates demands on our sources of energy and communication networks - both of which necessitate additional buried infrastructure. Safety-critical disturbances on infrastructure projects such as intrusions, strikes (Metje *et al.* 2015) or blasts of pipelines (Hayes *et al.* 2015), and cable breaks are not uncommon, but lack deep research understanding. While some of these incidents may seem minor (if there are no tragic consequences), it should be acknowledged that these minor incidents or small construction disruptions together can have a large impact on the safety of the construction workers. Further, the rework can also cause disruption to the public and local businesses.

The construction management research community should therefore strive for relevant findings for managing safety, increasing quality, and reduce disruptions during projects that take place in modern city spaces. This may also include the assessment of the role of smart construction methods such as, four-dimensional process visualisations (olde Scholtenhuis *et al.* 2016), and how they offer a new perspective on the emergence of, and reduction of, errors. Thus, further construction research into theoretical and empirical explorations of implications of automation, digitalisation, and robotics may provide advances into more systemic perspectives on safety and quality too.

As the industry embarks on the new challenges associated with larger buildings, innovative designs and new construction products, and as we orientate towards a low carbon built environment future, it is perhaps more important than ever to learn from previous failings that will help equip the industry for the journey ahead. Previous work on failure has typically focused on construction defects, with researchers highlighting that a comprehensive understanding is needed to learn and avoid them in the future (Hopkins *et al.* 2016). But there is very little evidence that this is happening. Drupsteen and Guldenmund (2014) undertook a systematic review of 47 separate studies that considered organisational learning through the lens of Argyris and Schön's (1996) models of learning cycles. One of their most striking conclusions was simply that while there are a large number of research studies, most are theoretical with too few examples of how incidents are actually used to learn from. More recently in 2018, Stemn *et al.* 2018 also reported limited implementation of learning from failure within industry, recording that the more straightforward notion that failure is merely an *undesirable or unintended outcome* is more prevalent.

With growing cities, as well as societal and sustainable demands, there are new challenges that will emerge for the construction industry. However, old challenges

remain, including the construction topics of danger, defects, disruption, and disputes. The Grenfell Disaster was a high-profile example of the systemic problems within the industry. The dangers and defects at Grenfell Tower are now evident, and there are still disputes into accountability, as well as the systemic disruption caused to other homeowners living in buildings with flammable cladding. Sadly, despite Grenfell and other notable examples over the past decade (e.g. Rana Plaza collapse 2013, Miami apartment collapse 2021), there has been little progress in addressing these systemic industry failures.

The lack of construction management research into issues that resulted in the disaster have highlighted there is a greater need for the academic community to undertake more relevant research into the systemic issues central to the industry. It is hoped that this special issue has opened these discussions and represents a call for further work on systemic issues that will be of practical benefit to the construction industry and provide pertinent research evidence for the use of policy-makers.

Disclosure statement

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