



Improving construction health and safety through knowledge transfer from the London 2012 Olympic Park

Questions for industry

With significant investment in UK infrastructure planned up to 2021 and beyond (National Infrastructure Delivery Plan and Pipeline), as well as the uncertainty caused by Brexit, it is essential that industry delivers projects safely and efficiently in order to showcase UK construction. Construction injuries and fatalities impose significant costs on companies and the government. In 2012/13 this cost was estimated to be in the region of £1.1 billion (Health and Safety Executive (HSE) 2014).

Knowledge is an asset that, if managed correctly, can facilitate continuous improvement. Construction is often defined as a 'knowledge based industry' and the importance of learning as a driver of performance improvement within the industry is widely acknowledged. However, can lessons from completed construction projects be learned and applied to wider industry?

What is the level of active knowledge transfer and management via cross-project learning in the UK construction industry?

Learning legacy

The Olympic Delivery Authority (ODA) left behind a learning legacy sharing the knowledge and lessons learnt during the construction of the London 2012 Olympic Park (OP). Through the ODA's learning legacy a significant volume of literature detailing best practice health and safety processes from the OP has been shared with the industry. The processes are broadly viewed as transferable into the wider construction industry. However, there is a lack of research exploring the impact the London 2012 legacy has had on UK construction health and safety.

Applying legacy learning

A project with demonstrable evidence of learning from London 2012 is the transformation of the London 2012 OP into the Queen Elizabeth OP. By adopting the ODA's health and safety model, the London Legacy Development Corporation (LLDC) and the contractors involved achieved an accident frequency rate (AFR) of 0.08, which surpassed that achieved by the ODA during the main construction works. This provides quantifiable evidence of a project benefiting from the learnings of London 2012.

A number of senior industry leaders provided anecdotal evidence of learning from London 2012 on their projects. Crossrail and the Battersea Power Station development have both adopted and developed a number of key health and safety learnings from London 2012 including common and visual standards, Safety Health Environment Leadership Team (SHELT), recognition and reward as well as leadership and supervision training. This suggests that the UK's major projects and organisations are adopting best practice learning from London 2012, but there is no evidence to suggest that small and medium-sized enterprises (SMEs) are behaving similarly.

The approach

The aim of this research was to investigate the extent of construction health and safety knowledge transfer from the London 2012 OP into UK construction. To achieve this aim, four objectives were developed: awareness, applicability, uptake and barriers. The influence of company size and role was also investigated.

Two rounds of semi-structured interviews and an online questionnaire were used to gather data and a sequential mixed method approach was adopted. Qualitative and quantitative data were synthesised with key literature to

provide a robust review of health and safety knowledge transfer from the London 2012 OP. A thematic approach addressing each research objective was used to present the significant findings.

The research population of 100 contractors was limited to contracting organisations which had been part of the ODA's construction supply chain, targeting individuals likely to have the most exposure to health and safety practices, including the following occupations:

- Health and safety directors or managers
- Project directors or managers
- Construction managers
- Site supervisors

A total of 41 responses were received from the 100 questionnaires issued. It was deemed that the individuals participating had sufficient industry experience and knowledge of London 2012 and responses represented all company sizes and ODA tiers. More than 60 per cent came from large firms and more than 50 per cent came from Tier 1 companies.

Challenges and opportunities

The literature reviewed highlighted concerns over the UK construction industry's health and safety performance, particular within SMEs. The conclusions have been linked to the four research objectives; awareness, applicability, uptake and barriers, as well as the influence of company size and role.

More than 90 per cent of the respondents worked on the project so a high level of awareness was expected. Despite this, and only three years having passed since the London 2012 Olympics Games, the level of awareness was generally low.

The lowest awareness was evident in SMEs. Low awareness is a concern as the research identified a relationship between awareness and impact.

Coding analysis of the follow-up interviews identified cost, culture and training as factors causing the variation in awareness between different company sizes.

Improving awareness within SMEs appears a significant challenge. Research identified that a top-down approach, combining improved training and leadership from larger contractors and less adversarial contracts from clients, would help to mitigate a number of the economic barriers experienced by SMEs.

Findings also suggest that the disbanding of the ODA post London 2012 had a negative impact on awareness but that the responsibility now falls to those who were involved in the project, as well as private and public sector clients, to transfer the knowledge.

The ODA published learning legacies covering six construction related themes. This research can conclude that, while all appear transferable, the health and safety lessons are perceived as the most applicable to the UK construction industry.

The initial interviews identified health and safety as the most influential theme. This was reinforced by the questionnaire, which identified a holistic relationship between transferability and company size, with larger firms perceiving the health and safety lessons as more transferable than smaller firms.

This is the first indication that the health and safety lessons learnt from London 2012 might be less transferable into SMEs. Findings identified economic factors as the key reason, as well as a lack of simplicity of the lessons learnt and poor governance in smaller firms.

Evaluation of the whole data set identified three initiatives driving the most change within an organisation:

1. Training for supervisors
2. Workforce engagement
3. Health and safety leadership

While the whole industry can benefit, certain initiatives will have a more significant impact depending on the size of the organisation implementing it.

Uptake, measured in terms of the impact learning from London 2012 had on an organisation, was lower than expected. Medium-sized firms appear to benefit the most from London 2012. This is due to larger firms already having the majority of the initiatives as part of their health and safety processes and the smaller firms being restricted by cost, time and resources.

Barriers preventing widespread improvements in health and safety and transfer of knowledge within construction include: programme, cost and resources. All barriers are exaggerated within smaller construction companies suggesting that these barriers stem from the fragmented nature of the industry.

Key recommendations

It is recommended that awareness of post-project knowledge transfer is supported by applying the following:

1. Use post-project feedback sessions and 'learning ambassadors' to promote learning and provide appropriate transmission channels.
2. The regulator (HSE or industry institutions) are best placed to be the custodian of new industry knowledge, especially when the client or project team disband post-project.
3. Share knowledge earlier rather than later. Thames Tideway is one major project that is already planning this approach for its legacy.

The research identified specific health and safety initiatives which are more transferable and have the greatest impact within large, medium or small companies. It is recommended that a company focuses on the initiatives most appropriate to their size:

Large (>250 employees)	Medium (50 to 249 employees)	Small & Micro (<50 employees)
Training for supervisors	Training for supervisors	Training for supervisors
Workforce engagement	Workforce engagement	Workforce engagement
Health & safety leadership	Common & visual standards	Common & visual standards
Occupational health & welfare		Recognition & reward

London 2012 H&S initiatives: Size driven recommendations

The research also pointed to the need for construction clients to recognise the importance of health and safety on their project and promote the health and safety agenda from the project's outset.

Decisions made during the tender process can influence health and safety during construction. Selecting appropriate tender processes and collaborative, non-adversarial contracts can help to mitigate these barriers and encourage health and safety best practice and learning.

In summary, increasing awareness, focusing on specific lessons and overcoming key barriers will support the construction industry to adopt best practice and to operate more safely and efficiently.

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The Laing O'Rourke Centre for Construction Engineering and Technology, in the University of Cambridge Department of Engineering, was launched in 2011 with industry partner Laing O'Rourke to fulfil a shared vision of transforming the construction industry through innovation, education and technology. The Construction Engineering Masters (CEM) degree programme is designed to shape the next generation of industry leaders and undertake innovative research projects that deliver value to industry.

Case study

This case study is based upon a Laing O'Rourke Centre for Construction Engineering and Technology Construction Engineering Masters dissertation titled: *A review of construction health and safety knowledge transfer from the London 2012 Olympic Park into UK construction* (2015). The research is by James O'Brien, Associate, Atkins.

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