UNIVERSITY OF CAMBRIDGE
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CONSTRUCTION ENGINEERING MASTERS DISSERTATION ABSTRACT

Mind the gap: enabling creativity and innovation in public-sector infrastructure design

Today, public-sector infrastructure projects face increasing risk aversion and fixed mindsets that may constrain creativity and research.

Public expectations of infrastructure facilities are rising faster than public resources or budgets (Liedtka et al. 2017a), yet the public sector also has other complex challenges to confront. Providing value for money, upholding acceptable standards and continuity of services, maintaining accountability to taxpayers, and surviving under media scrutiny are just a few of its convoluted obligations. Meanwhile, Parliament, the National Audit Office, and the Public Accounts Committee all contribute to the growing culture of risk aversion (Mulgan & Albury 2003). In this culture, being more innovative with fewer resources requires the right environment.

The aim of this study is to assess the perceived levels of risk aversion, compliance, and freedom to explore and experiment (necessarily involving failures) in public-sector infrastructure design. In so doing, it will gauge the effects of an **enabling environment** on public-sector employees and evaluate the impact of design thinking on creativity and innovation. An enabling environment (EE) is conducive to change and the emergence of new ways of organising.

This study seeks to answer the following research questions:

1. How does an enabling environment affect creativity and innovation among public-sector office employees in the UK?
2. What is the impact of design thinking on creativity and innovation in public-sector infrastructure design?
3. Which underlying principles are applicable to other organisations or industries?

The research was both quantitative and qualitative. Bringing together the theories of complexity science and design thinking, using variables for the broader, holistic context, developed a rich methodology appropriate to the research questions and the problem space. Three methodological approaches, designed in a sequence to complement each other, began with an industry-wide, web-based questionnaire, completed by 282 participants, to establish quantitative data. This made it possible to explore perceptions of the impact of an enabling environment on creativity and innovation in the public sector. Second, sixteen in-depth interviews were conducted with senior design leaders to gain insights and collect qualitative data about using design-thinking and innovation tools. Third, the output of these questionnaires and interviews informed the development and implementation of a six-week trial that used a sample group to ascertain how design-thinking tools and office-environment variables affected employees' innovation and creativity. The results were measured against a comparison group.

Throughout the trial, the group trained in design thinking showed a considerably higher use of creative tools, with these delivering a greater impact. The biggest difference between the two groups was seen in the use of ethnography, user research,

experimentation, and visualisation tools, which all supported greater creativity and innovation.

The results also suggest that office-environment variables affect the use of design-thinking tools. In the second week of the experiment, the sample group experienced high stress levels and scored lowest on the use of creative tools. Consequently, we can infer that when environment stressors (for example, busyness, bureaucracy, and pressure) are high, innovation tools, such as experimentation and prototyping, are used less. Unexpected data further indicated that variables such as employee holidays should not be underestimated when creating an innovative environment that fosters learning.

Overall, these findings present a challenge to the prevailing culture in government organisations. The application of design thinking has a demonstrably positive impact on design and creativity in risk-averse cultures. Thus, the gap between the construction industry as it is today and the freedom to experiment, prototype, and try things in a safe environment needs to be closed. There is a need to create and value a 'currency' in learning from experimentation, regardless of the success of individual experiments.

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