

WHOLE LIFE PERFORMANCE PLUS DEFINING THE RELATIONSHIP BETWEEN INDOOR ENVIRONMENTAL QUALITY AND WORKPLACE PRODUCTIVITY

By:
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Summary findings from a review of the existing research

- Previous studies on the effect of indoor environmental quality (IEQ) on workplace productivity have focused on individual parameters of the environment and performance in specified activities – for example, a 21% decrease in cognitive function when indoor CO₂ is increased by 400 ppm¹ – rather than the complex interactions we see in workplaces.
- Most of these studies have been conducted in controlled, static conditions, which are often not representative of the real world.
- Studies have often relied on self-reported assessments of working environments and productivity to quantify a relationship between IEQ and productivity, rather than measuring performance directly.
- A new meta-analysis, a statistical review of Innovate UK's previous building performance evaluation project database, showed that comfort explained 72% of the perceived productivity variation.²

Introduction

GDP per worker in the UK is reported to be 30% less per hour worked than in other European nations. The 2016 Stoddart Review³ concluded that the workplace has a role to play in closing the productivity gap, and recent research shows that part of the workplace benefit can be achieved through improving the quality of the indoor environment, which can improve the cognitive functioning and productivity of staff. The aim of the Whole Life Performance Plus (WLP+) project is to develop tools that will allow the productivity of existing, or new, workplaces to be benchmarked, improved and maintained at their optimum level.



The NATS Corporate and Technical Centre
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The WLP+ research project, which is supported by Innovate UK and the Engineering and Physical Sciences Research Council (EPSRC), is looking at the relationship between IEQ and workplace productivity. The aim is to identify the best indoor conditions for enhancing people's productivity, while at the same time reducing energy consumption.

The project started in February 2016 and is due to complete in autumn 2018. A seven-party consortium is responsible for delivering the project, with the building performance consultancy LCMB as the industry lead and Oxford Brookes University as the academic lead. The industry partners include Argent, EMCOR UK and King's College London. The BCO and Constructing Excellence are dissemination partners.

The industry partners were chosen to reflect a range of building ownership and management models: Argent as a developer and landlord, EMCOR UK as a facilities management provider, and King's College London as an owner occupier. In addition, the buildings selected for the trial vary in specification, allowing the project to investigate the feasibility of deployment across a range of office specifications and sophistication. Buildings in the study range from a BREEAM Outstanding mechanically ventilated new build to a heavily populated naturally ventilated office space with older plant and limited building controls. The diversity of space, management and organisational approaches allows the project to test the practical challenges of delivering an IEQ productivity solution while investigating the statistical link between indoor conditions and performance in an academically rigorous way in real-world environments.

Project methodology

The project is being conducted in three distinct stages: baseline, intervention and validation. The baseline and intervention phases are being delivered in two of the case study buildings, and the findings and conclusions will be

CASE STUDY

NATS Corporate and Technical Centre, Whiteley, Hampshire



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EMCOR UK is the facilities management (FM) provider for NATS, the air traffic control company, which is one of the trial sites for the study.

'We have known for some time that people react differently to environmental conditions based on factors such as temperature, ventilation and natural light,' says Dan Clark, head of central services and assurance for NATS FM. 'However, there has been no guidance detailing the correlation between variance in these conditions and productivity.' Steve Dolan, strategic director at EMCOR UK, says FM for organisations such as NATS had been asset-focused, concentrating on cost efficiency while optimising service levels. 'It is a great opportunity to provide a real-world application for the theories and models being developed, as well as an interesting learning curve as to what makes our building users more productive and feel engaged with their place of work,' he says.



James Clerk Maxwell Building, King's College London
Courtesy of King's College London

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trials in the third building. The baseline and intervention periods will each run for 6 months and the validation phase will run for a further 6 months.

During the baseline stage, the indoor environmental conditions were continuously monitored using a range of IEQ sensors and energy monitoring equipment. At the same time, occupants in the study area completed tasks and surveys to assess their performance and productivity. Additional data were also collected, including occupancy, absenteeism, energy consumption and help-desk reports.

The intervention phase repeats the information gathering exercise from staff but is making subtle changes to the space in order to quantify the impact of the changes. The intervention phase will be completed by March 2018, and results will then be tested in the validation phase. The aim of the validation phase is to trial a real-time data platform that will analyse live data from the building and environment to inform subtle changes that can be made to system plant, with the aim of keeping the IEQ at optimum levels.

Baseline results

While the statistical relationship between IEQ and productivity will not be known until after the intervention phase, many learning outcomes from the baseline period have either validated existing research or provided valuable lessons for wider deployment in the workplace. These include the outcomes described below.

Technology

- Building management systems are not well suited to data collection and analysis. Platforms are often inflexible and modifications are expensive.
- IEQ sensor technology is a rapidly expanding field and there is a wide choice of products on the market. Building operators need to understand exactly what they are collecting data for and how the data will be used so they can choose the best sensors for the job.
- Integrating new and existing data systems is challenging but can deliver valuable new insight into building performance.

Productivity data

- While there is an interest in productivity, most organisations have poorly defined metrics and systems for tracking staff productivity.
- Organisations are reluctant to share information on staff even when this is anonymised.
- Existing data sets are often incomplete, inaccurate or inaccessible.
- Getting access to data in large organisations can be challenging when data streams belong to a number of different departments.



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Project outcomes

The WLP+ consortium expects to be able to launch and share its workplace performance tools in autumn 2018, and the BCO will be hosting a seminar to report the outcomes from the project in 2018. You can keep up to date with the project by visiting the WLP+ website www.wlpplus.com or by contacting LCMB (tom@lcm.co.uk) or Oxford Brookes University (rgupta@brookes.ac.uk). ■

References

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ABOUT THE BCO

The BCO is the UK's leading forum for the discussion and debate of issues affecting the office sector. Established in 1990, its membership base comprises organisations involved in creating, acquiring or occupying office space, including architects, lawyers, surveyors, financial institutions and public agencies.

The BCO recognises that offices don't just house companies, they hold people and so what goes on inside them is paramount to workplace wellbeing.

ABOUT THE AUTHORS

Tom Cudmore is a Senior Consultant with LCMB, and project manager for WLP+. Tom has experience in both building operations and employee wellbeing, and believes we can do much more to improve the quality of workspaces for building occupants.

LCMB's mission is to improve the way buildings work, closing the gap between actual and potential performance. LCMB helps its clients realise maximum value from their buildings, and provides benefits through improvements in staff productivity, enhanced wellbeing, carbon reduction, reduced operating costs and improved standards of delivery.

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