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Does a BREEAM "Excellent" building deliver an excellent working environment for its occupants? A building case study.

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Abstract

The subject of this study investigates a BREEAM 2006 "Excellent" refurbished office building to test the hypothesis that achieving this high standard does not guarantee the delivery of a healthy and comfortable working environment and specifically that BREEAM's Health and Wellbeing section is not robust enough to ensure implementation. Methods include a semi-structured focus group with a representative sample together with a Building Use Studies survey distributed to all building's occupants (achieving 85% response). It is found that a combination of issues, related mostly to thermal comfort and noise, exacerbated by lack of individual control, as well as poor response by management to requests for change, have led to occupant dissatisfaction. Finally the hypothesis is confirmed in line with other peer-reviewed research in this field (Holmes, Copper and Brown, 2008) with the recommendation that post-occupancy evaluation becomes a compulsory component of BREEAM methodology.

Keywords: BREEAM; Post-occupancy evaluation; Building Use Studies (BUS); Health & Wellbeing.

1.0 Introduction

One First Street (OFS) and its occupants, in Manchester, England, was used as a case building study to research into BREEAM methodology and its ability to deliver a healthy and comfortable environment for the occupants.

BREEAM is accepted to be the construction industry's preferred environmental assessment tool for non-domestic building projects, however few building-based critiques and research have evaluated BREEAM effectiveness in delivering the above.

The research investigated a BREEAM 2006 "Excellent" refurbished office building, located in Manchester, to test the hypothesis that achieving this high standard does not guarantee the delivery of a healthy and comfortable working environment, and specifically that BREEAM's Health and Wellbeing section is not robust enough to ensure implementation.

A semi-structured focus group with a representative sample of occupants was carried out, followed by a Building Use Studies survey distributed to all building's occupants. It was found that a combination of issues, related mostly to thermal comfort and noise, exacerbated by lack of individual control, as well as lack of adequate response to requests for change, by the FM led to occupant dissatisfaction. The final

recommendation stated post-occupancy evaluation is to become a compulsory component of BREEAM methodology.

2.0 Research Methodology

The research of this thesis concentrates on the qualitative aspect of the BREEAM assessment methodology with respect to the Health & Wellbeing section, as this refers directly to the occupants of the assessed building: staff of Manchester City Council (MCC). This qualitative aspect is then investigated through the use of survey methods to produce quantifiable data to aid its analysis.

The approach to the primary research is set out in two parts. Firstly a focus group with MCC staff representatives, who voluntarily nominated themselves to take part, to develop an exploratory stage of social research (Matthews and Ross, 2010), by way of a less structured format, to understand perception and views on comfort within OFS.

Following the focus group, a post-occupancy evaluation questionnaire was then chosen as a form of survey for the second stage of this research, which was distributed to all occupants on a chosen and agreed day.

3.0 Post Occupancy Evaluation questionnaire - a survey method

The BUS (Building Use Studies) questionnaire was implemented in this research. The method was developed originally for the Probe study in 1995 (Usable Buildings Trust, no date).

The BUS questionnaire was used over the option of creating a bespoke POE, to benefit from the peer-reviewed work carried out by the Usable Buildings Trust and Building Use Studies over the past 25 years (established in 1985), which has enabled the collating of a substantial database. This database has enabled UBT/BUS to develop national benchmarking together with ongoing critical appraisal. The implementation of the BUS method survey allowed the quantification of the occupants' feedback in a meaningful manner. The resultant data of new research can be compared the the method's established benchmark analysis as well as against other building studies research, supported by Leaman's statement that such POE method "[...] incorporate benchmarks based on performance evaluations of the buildings in use, not models, simulations or design prescriptions" (2003, p.3).

4.0 Defining Comfort and Wellbeing

The definition of "comfort & wellbeing", used within this research, sits amongst the extensive work of researchers such as Bill Bordass and Andrew Leaman of the Usable Buildings Trust/Building Use Studies, who define "comfort & wellbeing" as those conditions that when present in harmony in an office environment provide the optimal settings for good productivity (as expressed by the surveyed occupants) (Leaman, 2004), such conditions are "[...] in order of importance: thermal comfort, ability to take action quickly when things don't work, no unwanted noise and enough space" (Leaman, 2004, p.1). These conditions as "satisfactory" when the "basic needs" (Leaman, 2004, p.2) of occupants are met in their working environment to aid a good level of productivity. BUS and UBT studies have shown how, when occupants feel they are productive and their working environment aids their productivity, they

feel content with, for example, their thermal comfort, level of background noise and lack of unwanted interruptions.

5.0 Findings

The BUS survey questionnaires was handed out and collected on the same day.

85% responses were received. 430 questionnaires were handed out and 365 collected.

The most relevant results inform the occupants' present dissatisfaction with ventilation rates which directly affects thermal comfort, with the artificial lighting and its automatic control (movement sensor) and noise, mostly arising from colleagues due to the open plan nature of the office. This is exacerbated by a strong lack of personal control over these elements and poor response to requests of change, by the occupants, when things go wrong. Although less quantifiable, but valuable in people's wellbeing, comfort and ability to undertake their tasks is the provision of space fit for purpose and the ability to personalise the workspace, to create identity.

5.0.1 Ventilation Rates

In both the summer and winter periods, occupants of One First Street are quite dissatisfied with their working environment ventilation rates. With regard to air (ventilation) over the summer period, 80% of the respondents found the overall ventilation to be on or below the midscale point of 4 (55% found to be air ventilation in both summer and winter unsatisfactory). Only 2% agreed completely with the summer ventilation being satisfactory.

The focus group discussion had begun to highlight dissatisfaction with the droughty nature of the building's (mechanical) ventilation, which was interpreted and expressed by the occupants as cold blasts of air making the staff feel uncomfortable even in summer. This was confirmed by the questionnaire's accompanying comments.

The issues found with the air/ventilation in summer are exacerbated even more during the winter period, together with complete lack of control over the adjustment of ventilation, and were found to have a direct impact on the occupants' thermal comfort.

5.0.2 Thermal Comfort

The figures below illustrate the findings on occupants' thermal comfort, both in summer and winter. The relevant comments highlighted in the BUS survey and confirmed also by the responses given in the focus group, accentuate the issue of variable and cold temperatures all year round, forcing the occupants to wear various layers of clothing (both in winter and in summer).

20% of recorded comments mention the word "cold" in a negative light, while statements that identify issues of variability (i.e. lack of stable temperature) which express the words "too hot and/or too cold" are found 30 times.

This is once more exacerbated by the lack of personal control and, what seems, non existent thermal zonings.

Figure 1 shows occupants' dissatisfaction with thermal comfort in summer (55% dissatisfied occupants overall and 46% found it too cold). ©BUSMethodology2011

Figure 2 shows occupants' dissatisfaction with thermal comfort in winter (58% dissatisfied occupants overall and 61% found it too cold). ©BUSMethodology2011

5.0.3 Artificial Lighting

With regard to occupants' satisfaction with artificial lighting overall and with the presence of glare caused by the artificial lighting luminaires, Although close to the midpoint scale values, data show a slight inclination towards dissatisfaction. The comments are clear in expressing disagreement with the level of artificial lighting within the office environment, in fact 69 comments correlated bad lighting to malaise such as headaches and poor eyesight.

39% of respondents found the level of artificial lighting too much, but the lack of control due to the movement operated sensor was highlighted as the focus of the greatest frustration and dissatisfaction. Motion sensors were used as an energy saving solution to control lighting, but were not able to respond adequately to office hours with fewer staff occupying the space.

5.0.4 Noise

Noise brought out unexpected data with regard to "comfort & wellbeing". From the anecdotal evidence collected during the Focus Group as well as the data from the BUS survey, noise appeared to be a major issue that affects the occupants' working at OFS, but contrary to other aspects (such as thermal comfort, for example) the BUS survey showed an understanding of noise issue being due in equal measures by the occupants themselves as well as by the shortcomings of the building. While data for 'overall noise' verged more towards 'satisfactory' than 'unsatisfactory', 'noise from colleagues' was highlighted as causing major tension with a poor score.

Within comments expressed by the occupants in the BUS questionnaires, 11% referred to issue of noise, with the correlation between loss of concentration/ productivity and unacceptable noise levels, comments expressed strong feelings about noise as distraction and increase of stress levels. Issues of noise and productivity were also strongly correlated to working in an open plan office.

5.0.5 Lack of Control

The figure below, shown for Ventilation as an example, is repeated across criteria such as Cooling; Heating; Lighting and Noise and shows the complete lack of control, as expressed by the surveyed occupants.

Figure 3 shows lack of occupants' control over ventilation. ©BUSMethodology2011

The combination of all these factors, as illustrated in this section, contribute to Productivity. When such combination sums up to a negative outcome, productivity is adversely affected. 44% of the surveyed occupants felt their productivity at One First Street was reduced because of their general discomfort and office induced malaise (for example: headaches, itchy eyes, dry skin).

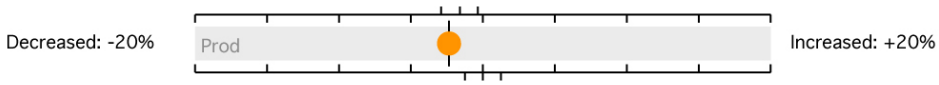

Figure 4 shows the surveyed data regarding occupants' productivity. ©BUSMethodology2011

6.0 Further issues critical to occupants' overall comfort

The BUS survey revealed other aspects which weight decisively on occupants' overall comfort (which are also not covered by the current BREEAM Health & Wellbeing criteria).

These include mostly occupants' dissatisfaction and frustration with poor speed & effectiveness of response to request for changes followed by discomfort with lack of privacy and working space suitable to various documents format. While dissatisfaction with speed of response and furniture is quantifiable, through a survey method like the BUS questionnaire, strong discomfort about lack of privacy has been brought to light mostly only through comments.

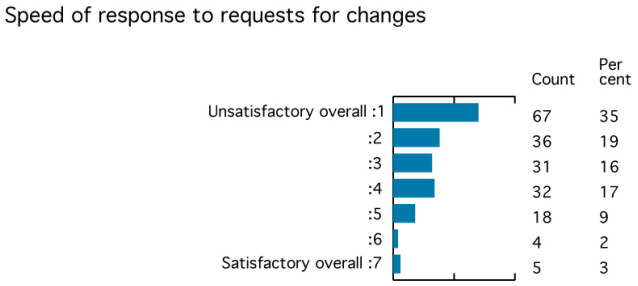

Figure 5 shows "Speed of response to requests for changes" ©BUSMethodology2011

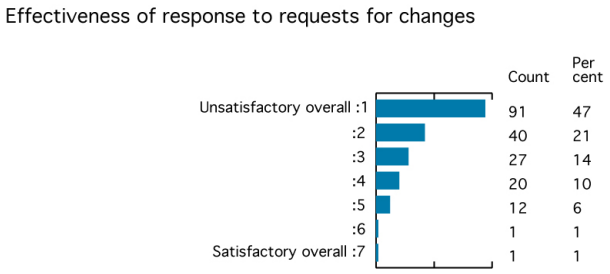

Figure 6 shows "Effectiveness of response to requests for changes" ©BUSMethodology2011

7.0 Conclusions

As the findings have shown, the issues expressed by the surveyed occupants have an adverse impact on their productivity. What this specific research study may lack in scope, it makes up for its in-depth findings validated by the high response received from the BUS survey (430 distributed questionnaires, 85% response achieved). The findings of the research have provided an excellent set of data, used to discuss the response to the thesis question and the original hypothesis. The findings have provided evidence that with regard to the thesis' specific building study, a BREEAM Excellent award has not provided an excellent working environment for its occupants, on the contrary due to various factors, combined with poor management, worrying similarities were also discovered between the internal environment of OFS and those of buildings affected by Sick Building Syndrome (Tong and Wilson, 1990).

The implications of this research are further evidence of the necessity to implement compulsory post-occupancy evaluation which has to be carried out over a period of time in which the building is occupied. This could be easily implemented by making the, already in place, "In Use" BREEAM monitoring, which currently is compulsory only for buildings that achieve an "Outstanding" scoring. The "In Use" monitoring would ensure that both the building owners as well as the tenants' management would be required to implement all requirements, necessary to the upkeep of the original BREEAM award. This would go some way to avoid failing in achieving, in actual practice, vital criteria in the Health and Wellbeing section. If a post-occupancy evaluation system such as the "In Use" method would have been implemented at One First Street, many of the issues and discomfort expressed by the occupants would have not occurred or at the very least would have been dealt with promptly and effectively.

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