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Factors for success, or how to compensate for things you take away
by Bill Bordass, William Bordass Associates, 10 Princess Road, London NW1 8JJ

BACKGROUND
Buildings are supposed to create more comfortable and convenient environments inside than outside. As a general rule, the happier people are with the building, the more productive they say they are. Actual productivity is more difficult to measure - except for very routine tasks - but self-assessed productivity has proved a robust indicator in practice.

FACTORS POSITIVELY ASSOCIATED WITH COMFORT AND PRODUCTIVITY
Taking a "real word research" perspective, one can use occupant survey results to identify ways in which people can usefully affect outcomes within their areas of influence (here typically building design and management strategies), without requiring a rigorous variable-by-variable understanding of cause and effect - which is usually impossible in buildings.

Questionnaire surveys indicate that building-related comfort is positively associated with:
- Jobs in which people are not tied to one place.
- Shallow building depth, in particular with a high proportion of window seats.
- Small workgroups.
- Low occupation densities.
- Good perceived control.
- High management responsiveness.

Further investigation indicates - not surprisingly - that perceived control is particularly important where standards and provision are not at objectively the highest levels. A corollary to this is that the self-assessed productivity differences between staff who regard themselves as more and less comfortable decrease as the overall perceived comfort level improves.

Many other things, of course, also affect what people feel about their workplaces, e.g. the nature of the organisation; satisfaction with job and colleagues; health; personal factors at home and at work; and so on, but these are not generally under the influence of the designers and managers of buildings.

Of course, frequently organisations use new and adapted buildings as vehicles for making changes in working patterns. Where this happens, it is important that the business and building strategies overlap: while a building can assist organisational change, it cannot make up for shortcomings on the management and human resources side.

PROVIDE THE BEST, OR AVOID THE WORST?
A seemingly well-kept secret is that comfort is the absence of discomfort. Design strategies therefore usually aim more to provide comfort than to avoid discomfort. But - as Diane Haigh's work in the late 1970s showed - user perceptions are greatly influenced by what happens when their personal "crisis of discomfort" is reached, even in anticipation.

"The one 'controlled environment' school in our sample provoked vastly more grumbles than ... the inadequate, but adjustable, older schools. ... An anxiety about their abilities to 'avoid the worst' lurked in the back of many teachers' minds."

"The teacher's mere knowledge that she could over-ride the thermostat and switch on the heater boost fan compensated for a lot of discomfort in the demountable classroom [Haigh does not say what the children thought!].   The inter-war school had an excellent compensating device for summertime overheating ... a real garden with mature trees"

DISCOMFORT AVOIDANCE AND ADAPTIVE OPPORTUNITY

As indicated above, discomfort can be avoided in many ways, and in particular:

1   Technical systems adjustments, for example altering the thermostat, opening the window, lowering the blind, switching the light, or ringing the manager.

2   Moving somewhere else, not only into the garden, the restaurant or a quiet room, but more locally perhaps moving out of (or into) the sun or draught, or sitting on a radiator; and also

3   making personal adjustments: removing a jacket, putting on glasses, adopting a more open posture, or having a hot or cold drink.

The sum of such measures has now become known as adaptive opportunity: the degrees of freedom occupants have to tune the environment to themselves or themselves to the environment.

MANAGING A DEPENDENCY CULTURE

Modern management theories of teamwork and interaction, often reinforced by design objectives, frequently deprive people of adaptive opportunity:

-    Sealed, air-conditioned buildings increase reliance upon engineering systems.

-    Open-planning - often intended to increase flexibility and/or density and improve interaction - tends to destroy privacy and make personal control difficult.

-    Space-planned designs, often with linked items of furniture, make it impossible for many people to make even minor changes to their workstations or seating positions,

-    It is also often difficult for individuals to make even minor adjustments to where they sit in order to avoid what might otherwise be minor problems such as local draughts, or glare on computer screens.

These trends, which tend to disempower individuals from being able to adapt the environment to suit them, create an increasing dependency on management. This of course helps to explain the growth in the facilities management profession. What is not so often appreciated is the degree to which such changes increase the levels of excellence required in briefing, design, execution and management. Buildings which are under-resourced in these respects (i.e. most of them!) will then tend to be less well-liked by their users. This counteracts and sometimes even undermines the intended operational benefits of the new working environment.

USING NATURAL LIGHT AND VENTILATION

Occupant surveys over several decades have indicated that people tend to be more tolerant of conditions in naturally-ventilated buildings than in sealed ones. However, most of the naturally-ventilated buildings surveyed tended to be shallow-plan ones in which the occupants had window seats, frequently in cellular offices, and reasonable personal control. The results can be therefore be understood in terms of greater adaptive opportunity: non-optimal performance in a control-rich environment is less annoying than in one with few means of adjustment.

Over the past decade, people have been attempting to use natural light and ventilation in spaces which are deeper and more complex than hitherto, and to optimise performance by using computer modelling in the design and automated control in the management of the building. The results have been interesting and imaginative, but occupant satisfaction levels have not always been as high as anticipated, often owing to the destruction of adaptive opportunity and the absence of mitigating strategies. For example, one usually finds:

-    A lower proportion of window seats.

-    People remote from the windows being more affected by the adverse effects of the natural systems (particularly draughts and glare) than by the positive ones.

-    Difficulties in getting the automatic control systems to work as intended: owing to the novelty of the applications and the fact that the detailed design, installation, commissioning and usability of most systems seldom lives up to expectations.

-    Automatic controls which deprive and infuriate rather than empower the user, for example closing blinds when they wanted the sun, switching lights on which they did not need, and opening windows to let in draughts, noise and insects.

-    An insufficiently high level of management awareness, provision and information to cope with the problems above.

PERCEIVED CONTROL

Good perceived control does not necessarily require a plethora of building services control devices. It can be good in both simple naturally-ventilated building, and in sealed, air-conditioned buildings with very few things for occupants to adjust but with competent, effective and responsive management.

- Perceived control becomes less important the more satisfactory the base conditions are.
- Hence one can achieve high levels of comfort with few means of control.
- However, you can't please all the people all the time, because their states, requirements and preferences vary.
- Buildings are also unlikely to have uniform environments owing to inevitable variations in heat gains, occupancy densities, proximity to facades and services terminals, and so on. Even if they do, people may dislike the blandness, though not necessary as much as the adverse effects of uncontrollable discomfort in non-uniform environments.

There is thus a real choice between a closely-specified environment with relatively low perceived control and a less-exactly controlled one which offers more adaptive opportunity. With good design, the latter may also be less expensive to build, to manage, and in its energy requirements.

CONCLUSIONS

In spite of the wealth of evidence that better perceived control and adaptive opportunity can bring benefits such as improved comfort, health and productivity, designers, developers and even clients seem reluctant to act on it.

- Environmental control operates at the interface between the technology of a building and its human occupants.
- Designers appear to be seduced by the promise of technology and to think less about its usability. Hence more functions are assigned to automatic controls than are usually warranted and the user interfaces are often absent; badly-designed and located; or obscure, with useful feedback often absent.
- Poor attention to detail in building controls is a common symptom of an incomplete design and specification process and gaps between areas of professional responsibility in briefing, design, execution, handover and reality-checking.
- Manufacturers find it difficult to invest in the required products and services owing to a diffuse market which often fails to recognise the added value that could be offered; or competes it out of existence in favour of a lowest-common-denominator industry standard.
- Few designers appreciate the complementarity between comfort-provision and discomfort-alleviation. The absence of such capabilities to fine tune can make the difference between annoying discomfort and reasonable satisfaction.

Sadly, few occupiers are motivated to take the bull by the horns and sort out systems which are troublesome. Of those who do, most find it easiest to adopt quick-fix solutions which are energy-wasteful. Yet study after study confirms that there is no need to use large amounts of energy to keep people comfortable: good briefing, good design, good execution and good management can achieve both - and cost-effectively too!

SUMMARY

Make sure you know what you might be taking away so that you can either avoid doing so, or incorporate suitable compensating mechanisms.

- Understand the contexts and ruling constraints.
- Make sure everyone shares the same assumptions.
- Keep things as simple as possible (but not more so) and do them well.
- Seek robust solutions - minimise the downsides.
- Allow occupants choice where possible.
- Keep technology within affordable manageability, so that the inevitable revenge effects can be identified and dealt with before they turn into chronic defects.
- Provide a sufficient level of management to be able to support the occupants and respond rapidly to their comments.
- Take occupants' complaints seriously and deal with them competently and effectively.
- Let people know what you are doing, what you have done, and any constraints which remain.

FURTHER READING

D Haigh, *User response in environmental control,* in D Hawkes & J Owers (eds) *The Architecture of Energy,* 45-36, Harlow: Construction Press (1981).

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