The impact
of office design
on business
performance

cabe

british council for
offices

The refurbished HM
Treasury, winner of
the 2003 BCO
Refurbished
Workplace of the
Year Award

Foreword

'My own experience…confirms there are tangible benefits to be gained from workplace and organisational change. The Treasury [refurbishment] project (left) illustrates vividly the way the geography of an organisation can reinforce its culture and its management aims. Through the new building we have managed to create a sense of a modern, outward looking department, an organisation with an appetite for change. The building has developed a sense of inclusiveness, breaking down traditional hierarchy.

It has prompted communication, both formal and informal and has encouraged flexible ways of working. Above all it has fostered a feeling of self-confidence and presented an attractive image to the talent we need to recruit.'[1]

Sir Andrew Turnbull, Cabinet Secretary and Head of the Home Civil Service, May 2004

"The ways in which office accommodation can create value for a business…are inadequately understood."

In a 2003 survey by *Management Today* magazine, virtually all (94 per cent) of those responding said that they regarded their place of work as a symbol of whether or not they were valued by their employer. Yet only 39 per cent thought that their offices had been designed 'with people in mind'; and in another study no less than a third said that they were too ashamed of their offices to bring back colleagues or clients. This is the kind of gap which should worry management – and which, were it to occur in any other discipline in business, would almost certainly get urgent attention in the boardroom. So why do so many companies continue to dress themselves in rags in a country which must, in the face of growing international competition, earn its living by its wits?

The answer may be that a company's most natural response to that same force of competition is to seek to drive down its costs – and premises represent a cost that is both readily identified and readily comprehended. As in so many facets of life, however, a preoccupation with cost may actually destroy value: but the ways in which office accommodation can create value for a business, not just through economy but also through improving the effectiveness of its people and broadcasting positive messages about its values, are inadequately understood.

This study into the connection between office design and business performance is therefore both important and timely. It provides a positive route map for those facing the challenges and opportunities of addressing their business's accommodation needs; and it does this by:

- summarising what we actually know, so that we can embed this learning in good practice and avoid re-exploring the same issues

- summarising what more could be known, pointing to the need for further research

- proposing a framework for the analysis and application of accommodation factors which affect business performance

- suggesting a standardisation of the language and protocols by which this subject is pursued, so that we can accumulate a growing body of knowledge on this matter of national importance.

None of this will throw up easy answers, and one by-product of this study should be the abandonment of the very idea that there might be a single answer to any user's question – a holy grail of office design. The report does, however, point the way by which individual users might find their answer, and demonstrates that the effort is worthwhile.

For those who get this wrong, the best they can hope for is a missed opportunity; and the worst is nothing less than the loss of their key people as a consequence of growing dissatisfaction with their working environment.

For those who get it right, the reward, if not the holy grail, can be something almost as magical.

Paul Morrell, BCO President and CABE Commissioner

Why office design matters

Courtesy The Frank Lloyd Wright Foundation, Taliesin West, Scottsdale, AZ

"The collective failure to understand the relationship between the working environment and business purpose puts us in the position of early 19th century physicians, with their limited and erroneous notions about the transmission of disease."

When Frank Lloyd Wright designed a new office building for the Larkin Company in Buffalo, New York, exactly 100 years ago, he wasn't working on his own. His clients were pioneers in the rapidly expanding mail order business; and they wanted a new office building to enhance their chances of commercial success. They chose Wright as the best architect available to help them reinvent the workplace to take advantage of the latest ideas in technology and management. Wright, despite his notorious ego, played a deftly handled part within a carefully directed and completely self-conscious managerial programme. His wonderful building, with its noble atrium, innovative environmental systems, all-round visibility, interconnectedness and inclusiveness, and its powerful, if by today's standards somewhat paternalist, imagery, was at least as much the Larkin Company's achievement as his. Each detail in the architecture of this extraordinary building had a business purpose: to support a commercial strategy, to accommodate innovative work processes, and to broadcast a particular set of business values.

Why aren't all office buildings today as purposeful as Larkin? How did we get from this shining example of using architecture as the infrastructure of business achievement to where we are today – in the land of Scott Adams' melancholy comic strip, Dilbert, based on his own experience of working in the offices of Pacific Bell, where cubes and labyrinthine interiors had become metaphors of bureaucratic frustration?

This question is the background to this study commissioned by CABE and the BCO to review the academic and scientific literature that has, over the last century, attempted to assess the relationship between the design of the workplace and business performance.

Those who commissioned this report and its authors share a strong desire to apply past research to lay the foundations of a rich and effective programme of study in an area of endeavour that is by any standards, a continuing challenge to social scientists, designers and, most importantly, clients.

This is an ambitious endeavour in a complex and little understood field, and it is hardly an exaggeration to say that the collective failure to understand the relationship between the working environment and business purpose puts us in the position of early 19th century physicians, with their limited and erroneous notions about the transmission of disease before the science of epidemiology had been firmly established.

Research on the relationship between office design and business productivity has generally started from design variables and then has sought to establish some organisational or business consequence. We have come to believe that one of the reasons for the relatively small amount of progress that has been made by such endeavours in this field is that this may well be the wrong starting point. An alternative perspective, tantalising but fugitive, has been expressed occasionally by business writers such as Tom Peters, who have looked at office design through the business end of the same telescope. They are far less curious about the consequences of design variables on business, and much more interested in the office design implications of business drivers and priorities.

Consequently, we have conducted this study using two different but highly compatible analytical frameworks. The first framework is DEGW's 'three e's', a means of measuring the potential of the office environment to help businesses become more efficient, more effective and more

expressive, The second is the widely respected 'Balanced Score Card', which we have found to be a useful means of communicating to management that the office environment is more than a financial matter but is relevant to business purpose in at least three other ways, in terms of human capital, customer relations, and business process. These frameworks have helped us to discriminate between the various insights that we strongly believe business people and designers should be demanding from research on the physical working environment namely: 'What evidence exists – or should exist – of ways in which office design can be used to help clients achieve their business goals?'

Looking coolly at the data we have surveyed, there is certainly a disappointing lack of relevance in most office workplace research to business performance, and we believe that a different approach will cumulatively lead to much more useful results. The recommendations to

developers, designers and researchers with which we introduce this report are based on what we see as the crucially important benefits of a research programme that links office design to business performance through maintaining a sense of business purpose within a systemic framework.
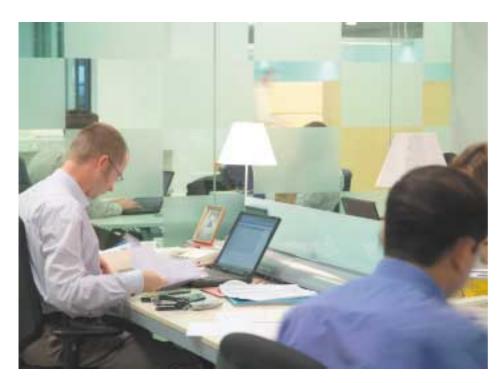
No single perspective can provide a complete set of answers to such a wide range of inherently interdisciplinary questions. An integrated research approach is essential because research in this complex and changing field cannot be conventionally academic. The experience and judgement of all of the key constituencies involved are vitally important to the success of any research programme. As one illustration of this, the economic dimension of the results of design initiatives is obviously critical. Developers need to make investment decisions that are more likely to lead to greater profit and are less susceptible to risk; and corporate real estate managers

need to demonstrate to senior management the contribution that workspace can make to stimulating and supporting business success.

At the same time, because of all these complexities, a robust medium is necessary to communicate measures of the performance of office space in relation to business goals. For example, the Harvard Business School case study approach provides an interesting precedent in communicating complex data involving many interests in a coherent and rigorous way. There are many similarities between the kind of data that are useful in the context of a business school, and the richness and complexity of the data that are necessary to explain the context, the objectives, the interplay of disciplines and interests, the timeline, the co-ordination, and the consequences that attend attempts to make the design of offices actually work for business purposes.

Francis Duffy, DEGW

"There is certainly a disappointing lack of relevance in most office workplace research to business performance, and we believe that a different approach will cumulatively lead to much more useful results."

Recommendations

The research suggests a number of key recommendations for the different groups involved in office development.

Recommendations for tenants and occupiers

- Diminish risk. Reduce exposure to inflexible real estate commitments
- Think harder about efficiency. Evaluate property decisions based on total cost of occupancy rather than initial capital cost
- Consider intensifying the use of space over time taking into account increased internal and external mobility, achieving greater efficiency
- Engage many people in the design process
- Encourage user control of the working environment supported by responsive facilities management
- Take greater responsibility for relating office design to business strategy at all levels
- Align workplace design with work processes, but anticipate continuous change in all areas of knowledge work, aiming for greater effectiveness
- Shift from thinking primarily about the design of individual workplaces to creating the collective environments that are more appropriate for knowledge work
- Use interior design to support and change organisational culture, exploiting the expressive potential of design.

Recommendations for developers

- Learn from what we know already to deliver best practice. There is no excuse for providing anything less than excellent performance in health, safety, and comfort
- Adopt the measures of health, safety, and comfort already used in research to assess environmental services, to evaluate the performance of the shells and skins of office buildings
- Anticipate greater tenant demand for choice: a widening variety of uses, shared tenancies and mixed uses
- Anticipate tenant demand for more flexible leasing terms to accommodate more rapid change and shorter management time horizons
- Establish longer-term relationships with tenants
- Become more involved in helping tenants with fit-out and design services
- Dare to go beyond efficiency. Adopt building forms that are designed to support tenant effectiveness – for example, by promoting internal communication, by attracting and retaining staff, by stimulating creativity
- Think more carefully about how buildings perform over time. Give separate attention to measuring the different potential contributions to adding value to tenants' businesses of building elements of different longevities
- Anticipate growing tenant demands for help with expression – for instance, with internal and external identity and branding.

Critical decisions

Recommendations for researchers

- Beware of the limitations for business purposes of depending upon conventional research methods
- Avoid conventional assumptions: work and technology are changing fast
- Be prepared to do more interdisciplinary research
- Think as systemically as clients, relating human resource management, information technology and corporate real estate issues
- Pay much more attention to business priorities and especially to how they are changing
- Focus on emerging business issues: image and expression, flexibility and adaptability, the relation between virtual and real spaces, the potential for distributed working
- Involve developers and design professionals as well as occupiers and tenants in the research process
- Understand the supply chain better
- Adopt a longitudinal approach, studying buildings in use over time
- Study a wider and more ambitious range of design and use possibilities
- Learn from business schools and their use of the case study method for both teaching and research.

For occupiers, the research points to critical decisions that each business must make within the context of its own objectives and priorities. These include:

1 **Staff productivity and satisfaction versus economic efficiency:** achieving appropriate levels of density, daylight, view etc, and balancing this with occupancy cost
2 **New ways of working:** choosing the working pattern that is suited to the business, and recognising the affinities between working patterns, building types and environmental models
3 **Organisational change:** workplace as a catalyst for change, with the capacity to demonstrate and foster values through internal and external messaging
4 **Concentration versus communication:** raising issues of acoustic and visual privacy, work group size, vertical and horizontal travel distance, building depth
5 **Individual versus central control:** raising issues of responsiveness of facilities management, the ability to control individual environment, simplicity/manageability and the efficient operation of the building and its systems
6 **Infrastructural flexibility:** providing flexible infrastructures that ensure connectivity and environmental quality through multiple iterations of organisational change
7 **Feedback:** using feedback as both a design tool, and as a means of monitoring that the workplace is delivering its full potential in terms of efficiency, effectiveness and intended expression.

Aim of this study

The changing world of work

This report investigates the existing literature that addresses the relationship between the design of the workplace and business performance. Businesses exist to return measurable value to stakeholders and the aim has been to identify, where possible, those designs factors that might make office environments more productive, serving strategic purposes of the business.

The context of the study is the changing world of work, as offices move from being a basis for process, to a system of communication, to places of social engagement. The factors that are driving this trend, and which have revolutionised the approach to office design include:

- the impact of information technology, and the personal computer in particular
- increasing competition for staff, and the consequent need for buildings which attract, retain and support staff of the necessary calibre
- competition between businesses, leading to a downward pressure on costs
- the realisation that office space is often highly under-utilised, and that the use of IT reduces the need for co-location of office workers
- the consequent development of new ways of working.

Increasingly intelligent businesses call for increasingly intelligent buildings, which are accessible, well located, flexible and with high levels of technological provision.

Gartner/MIT estimate that by 2006, about 30 per cent of the world's top companies will adopt a highly mobile work style model, with 35 per cent having a workforce working outside the boundaries of the formal workplace. This virtual work will require both appropriate space and the reassurance provided by direct access to the business and their peers. Organisations will have to create a new balance between collective and individual spaces, and acknowledge the increasing importance of the office as a space for social and interactive engagement.

In parallel, as businesses increasingly seek to differentiate themselves from their competitors, the use of premises as an internal and external expression of corporate values and culture grows.

In this new environment office design has been argued to influence a range of factors critical to business performance, including:

- optimisation of total occupancy costs
- responsiveness to business and technological change
- staff attraction, motivation and retention
- staff satisfaction
- knowledge and skills of staff
- innovation and creativity in the workplace
- catalysing cultural shift
- customer attraction and retention.

Establishing the extent to which these claims, often anecdotal, are supported by research and evidence is one key purpose of this report.

The challenge of measurement

There are, however, significant challenges both in analysing the research and in regarding it as an authoritative source for guidance. These challenges lie in the volatility of the business climate within which all performance needs to be measured; the complex interaction of forces that lead to improved business performance, and the difficulty of separating the impact of any one change; the difficulty of designing effective measures of productivity (and indeed, in the context of office life, how productivity itself might be defined); the skewed nature of the research that has been conducted which, notwithstanding its volume, tends to approach the question of connections between office design and business performance from the point of view of the office, rather than the business; and the lack of rigour in much of the published research.

The need for frameworks

There is consequently a need for a framework, or series of frameworks, within which the connections between business strategy, office design and business performance can be examined, the research can be organised, and recommendations can be made to individual businesses. There is, in addition, a need for a more settled language, both to aid communication between the many parties involved in office development, and to produce more consistency in research methodologies and the publication of case studies.
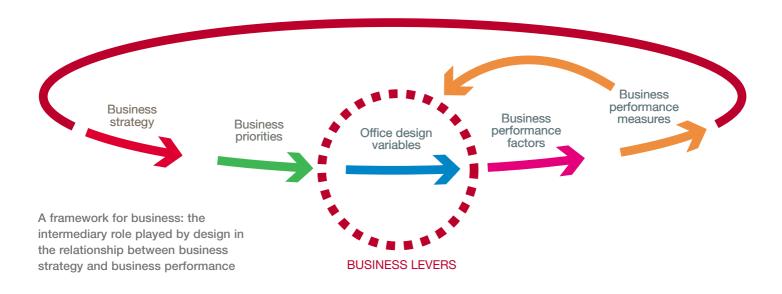
Fundamental to such a framework is the principle that the point of view of business should be the starting point from which to consider the relationship between business strategy and business performance and the intermediary role that office design can play.

Office design variables include the buildings themselves and their internal and external environments. Together, these can be looked at as a series of layers defined by building life cycles, with each component of the building having a

different longevity, from the infinite life of the site to the day-to-day variability of setting.

The way that these variables affect a business can in turn be organised under a framework that embraces three objectives, any combination of which might define a business's priorities:

- **efficiency:** making economic use of real estate and driving down occupancy costs (*getting the most from the money*)

- **effectiveness:** using space to support the way that people work, improving output and quality (*getting the most from the people*)

- **expression:** communicating messages both to the inhabitants of the building and to those who visit it, to influence the way they think about the organisation (*getting the most from the brand*).

A framework for business: the intermediary role played by design in the relationship between business strategy and business performance

Business strategy → Business priorities → Office design variables → Business performance factors → Business performance measures

BUSINESS LEVERS

The need for frameworks continued

The research evidence

A third framework, represented in the diagram below, provides a means of categorising the existing body of research and considering the need for additional research. This looks at degrees of knowledge: what is and isn't known; and the extent to which decisions are generic, applying to almost all office users (and therefore representative of best practice), and at the extent to which they are user specific (and therefore necessarily the subject of dialogue between an individual business and its advisers).

This diagram also represents a framework for research priorities. The bottom left-hand quadrant (general application, proven by data) can stand as a definition of good practice – conditions that building users should be able to take for granted. This is the raw material of the BCO Specification Guide. The bottom right hand quadrant (general application, unproven by data) points to an area for additional, valuable research.

The top left-hand quadrant (tenant specific, proven by data) provides advisers with the information they need to guide their clients. As for the final, top right quadrant (tenant specific, unproven), this really just points to an area of topics that can only be the subject of informed dialogue between users and their advisers, to find the solution that suits them.

Turning to the research itself, the literature examined has included two major databases[2], four key literature reviews[3], and a wide range of other primary information sources.

One inevitable conclusion is that the literature is highly skewed in both evidence and scope, and is largely written by and for academics, and to a much lesser extent design practitioners; rather than for business users. As for scope, the largest topic of research has been on environmental and ergonomic issues related to the comfort of individual office workers; research on the efficiency with which office space is used comes second; adaptability and flexibility has attracted some attention; and the fourth category is research related to supporting work processes.

A disproportionate amount of research energy has therefore been devoted to the performance of building services – rather than, for example, the accommodation of information technology, the design of office building shells, the performance of office skins etc.

In many ways the research literature reflects the introverted, supply-side thinking about office buildings that is unfortunately characteristic of many designers and researchers and that tends to be endemic in the construction and property industries.

Notwithstanding its limitations, however, the literature does provide key insights into the value of design for business.

The extent of knowledge: while the bottom left quadrant represents proven best practice there is a clear need for further research into generic design variables (bottom right) and a more effective dialogue on user specific variables (top right)

Research findings: the drive for efficiency

The cost of providing accommodation for office workers in terms of both capital (construction) costs and building running costs is dwarfed by the costs of their salaries and benefits. Looking at the discounted present value of developing, owning and operating a typical office building over the 25 years of a traditional occupational lease, this shows that, excluding land, 6.5 per cent of the total goes on the construction cost; 8.5 per cent goes on furnishing, maintaining and operating the facility; and, dramatically, the balance of 85 per cent goes on the salary costs of the occupiers.

These figures are based on the analysis of a real building and will vary depending upon the specification of the building, and its location, occupational density etc. However, as a generalisation, for a typical service business, construction costs, building running costs and business operations may be in the ratio of 1:1.5:15, where 1 represents the amortised cost of construction, 1.5 the cost of running the building and 15 the staff salaries and other business operating costs. The context for considering savings is therefore that factors that influence the effectiveness of staff will lead to far greater financial impact than those which affect efficiency.

Nonetheless, in Corporate Real Estate 'efficiency' has principally come to mean spatial efficiency. This has four components:
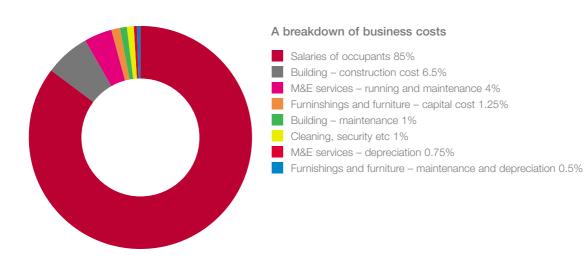
- **Landlord efficiency:** the proportion of gross floor area which is rent-earning, after the deduction of structure, cores etc – typically 75 to 85 per cent

- **Tenant efficiency:** the percentage of rentable area which is genuinely useable, after the deduction of secondary circulation – typically 85 per cent

- **Density of occupation:** the amount of net lettable space allocated to each desk space, which will vary between one desk per 5–7m^2 in trading rooms or other densely occupied office spaces to one desk per 15m^2 in companies having a high degree of cellularisation. There are indications that there is some loss of effectiveness, however, when densities are squeezed too tight say below one desk per 5m^2

- **Utilisation:** the number of people allocated to each desk space (rising above one person per desk space if there is some home working, desk sharing etc), and the proportion of the working week for which each desk is occupied (typically 45 per cent where every member of staff is allocated a desk, but much higher where efficiently run programmes of desk sharing are implemented).

Reductions of 30 per cent in occupancy cost have been recorded through the efficient design of office layouts. Greater savings emerge where efficient layout is combined with ways of working that permit desk sharing.

Efficiency must therefore be considered holistically, identifying the impact of substitution effects (such as a reduction in the need for physical facilities following investment in IT) and utilisation effects (the business benefits produced by effective workplace strategies).

If thinking is to become systemic, there also needs to be a consistency of language and methodology, of which one method is ETCO (the Enterprise and Total Cost of Occupancy) that measures the total cost of convening the workforce.

A breakdown of business costs

- Salaries of occupants 85%
- Building – construction cost 6.5%
- M&E services – running and maintenance 4%
- Furninshings and furniture – capital cost 1.25%
- Building – maintenance 1%
- Cleaning, security etc 1%
- M&E services – depreciation 0.75%
- Furnishings and furniture – maintenance and depreciation 0.5%

Research findings: the importance of adaptability and flexibility

The new (or knowledge) economy is characterised by a shift from value residing in tangible assets (bricks and mortar) to intangible assets such as intellectual property and knowledge. This significant transformation increasingly means that the ownership of physical capital, once the mainstay of capitalism, could now become a liability. Fixed physical assets cannot be reconfigured to meet changing business needs as quickly as organisational processes and structures. They may act more as a brake than as a springboard for change, given the significant shift between past and future patterns of accommodation need.

Investing in flexibility is consequently a means of offsetting risk, an insurance policy against the vicissitudes of the business cycle.

Flexibility needs to be considered in the context of both different stakeholders and different time horizons. Users and facilities managers may be more concerned with the longer-term issues of a building's responsiveness to changing requirements, whilst corporate managers are concerned with more short-term matters such as the utility of the building as a physical asset and its tradability once requirements

change. There is also a distinction between short-term flexibility (such as redundancy built into air-conditioning systems to handle changing occupancy rates) and longer-term adaptability. Both supply and demand sides should focus primarily on long term, robust decisions relating to site, shell, skin and services, whilst recognising that scenery, systems and settings are inherently more changeable.

Strategic decisions relate to the choice between owning and leasing the property, which will have an impact on an organisation's ability to handle long-term change; and the selection of the site by reference to its accessibility, local amenities, aspect, parking provision and fitness for multiple tenancies.

As a generalisation, medium-depth buildings with atria are more adaptable, and therefore more suited to businesses with a need for staff interaction and intermittent patterns of occupancy. Adaptability and flexibility is therefore a function of depth (with narrower floor plates struggling to accommodate a mix of cellular and open plan working, whilst floors over 21m in depth can have disadvantages in terms of comfort, aspect and environment); ceiling height (which,

with spare capacity in risers and machine rooms, provides flexibility in accommodating changing IT and services requirements); and regular structural and planning grids permitting relocation of partitions without interrupting services or blocking windows.

The flexibility required to accommodate shorter term changes is conditioned by adequate (but not excessive) redundancy in the design of air conditioning, lighting and related building services; the matching of environmental control systems to the specific nature of the working environment; the provision of local control for services; and provision in the services design for sub-division of the space into separate tenancies.

Particular forethought also needs to be given to the cost of moving staff within the building ('churn'), with many businesses having an annual churn rate of 50 per cent or more. A key decision is whether to regard churn as rearrangement of the office space, or rearrangement of the people within the space, 'the movement of people, not walls'. Separate studies have identified a 79 per cent annual reduction in churn cost in a building with a raised access floor and modular wiring,

PAST

- Location specific
- Owning space or long-term lease
- Highly territorial space
- Strong physical branding
- Formal structured interaction
- Physical space and mobile technology

FUTURE

- Network of locations
- Short-term lease, pay-as-you-go
- Alliance/shared/hired space
- Varied internal and temporary brand expression
- Flexibility, connections, implementation speed
- Operating across virtual and physical space

Research findings:
staff satisfaction
and performance

compared with a conventional north American office building with 'poke-through' wiring carried into the furniture system; and a 90 per cent reduction in churn cost in a building with underfloor air-conditioning, power and telecoms systems by comparison with a ceiling-based design.

Allied to adaptability and flexibility is the concept of manageability. The best performing buildings are those that have a consistent link between building technology and manageability, but the evidence is that most buildings display the worst combination of technological complexity and inadequate management resources to operate them effectively.

The challenge for the 21st century is to enhance knowledge worker productivity, analogous to dramatic manual labour productivity increases over the last century. A primary driver for this is to strive to increase levels of staff satisfaction.

In assessing staff satisfaction, organisational factors (hierarchy, culture, reward systems, leadership) have the largest influence, followed by individual factors (such as aspiration, reward, loyalty, self-motivation, aptitude, experience and training). The extent to which office infrastructure contributes to these factors is difficult to quantify, but claims have been made that the workplace is responsible for 24 per cent of job satisfaction and that this can affect staff performance by 5 per cent for individuals and (because of the benefits of improved interaction) by 11 per cent for teams. To put this in context, it has also been estimated that a 2–5 per cent increase in staff performance can cover the total cost of providing their accommodation.
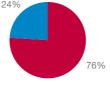
A few companies that have tracked turnover levels have made an explicit link to changes in the workplace, with measurable reductions in staff turnover and absenteeism, and measurable improvements in output.

"Staff turnover is costly. Replacing mid-level managers costs an estimated 50 per cent of salary, and there is a business benefit in investing to retain staff."

At a financial services firm in Sydney, staff turnover was reported to be down from 25 per cent to 11 per cent following an office refurbishment, although separating out the extent to which this was due to operational or design improvements requires validation.
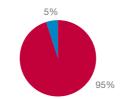
Similarly, in a major UK company, staff turnover in a call centre operation reduced by 11 per cent after a move to new premises (where the company estimated training costs at £13,000 per employee); whilst output more than doubled (from 35 calls per employee handled pre-move to 74 calls post move) over the same period.

Staff turnover is costly. Replacing mid-level managers costs an estimated 50 per cent of salary, and there is a business benefit in investing to retain staff. Studies also show that high performers have 40–80 per cent greater impact on firm performance than do average employees, so satisfaction measures for these staff are vital for organisational success. Increasingly, the knowledge of an organisation is tacit, its nature hard to codify. But this firm-specific tacit knowledge is increasingly the source of competitive advantage, and companies are increasingly vulnerable to the loss of key knowledge workers.
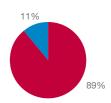
The effect of workplace design on staff satisfaction and performance

Job satisfaction — 24% / 76%

Individual performance — 5% / 95%

Team performance — 11% / 89%

■ EFFECTS OF
Technology
Pay/incentives
Advancement opportunity
Skill-to-task matching
Direction by managers
Work/life balance

■ EFFECTS OF
Workplace

A study that considered absenteeism, showed a clear effect in reduced absence from work in a group that had moved to new premises, by comparison with staff continuing at five other company locations.

In striving for staff satisfaction, there is a need to achieve best practice in the basics, specifically including health and comfort. A research study has shown that 14 million days are lost each year in the UK through absenteeism from work, at least 70 per cent of which is related to health issues, a small component of which may be attributed to comfort in offices. The most important factors in achieving comfort are a rapid response to reported problems, manageability, and the integration of air conditioning, lighting and related building systems. Post-occupancy feedback regularly shows, however, that these basic requirements of human comfort are not being delivered.

Comfort

Differences in productivity as high as 25 per cent have been reported between comfortable and uncomfortable staff. People cannot work at their best if they are distracted by not being able to breathe, hear and see properly. Individuals react differently to different stimuli (some being extremely sensitive to sound, others more sensitive to temperature), but the most important factors in achieving health and comfort are air quality, temperature, overall comfort, noise and lighting.

- **Air quality** The focus is on a decrease in reported symptoms attributed to sick building syndrome as a result of the improved delivery of fresh air. In one study 3 per cent of workers surveyed left early or stayed at home, and 8 per cent had reduced ability to work, due to symptoms attributable to insufficient fresh air in the workplace, and it was estimated that this lost time could be reduced by 20 per cent by improving the delivery of outdoor air

- **Temperature** Decreases in productivity of the order of 30 per cent have been found in offices experiencing extreme temperature conditions. In a research study, 23.5°C was reported as the preferred temperature, but 30 per cent of individuals prefer spaces warmer or cooler than this level. Anecdotal reports indicate that individuals perceive air quality (and self-assessed productivity) to be better when the temperature is cooler. An early 20th century controlled experiment reported a 46 per cent reduction in typing speed and accuracy at temperatures warmer than 24°C

- **Overall comfort** Increases in output, a reduction of repetitive strain injuries and a consequent reduction in insurance costs have all been reported as a consequence of proper attention to ergonomics

- **Noise** Workplaces are often perceived as either too noisy or too quiet, but significant improvements have been reported in the performance of both simple and complex tasks (38 per cent and 27 per cent respectively) when acoustic conditions have been optimised

- **Lighting** Good lighting design and adequate daylight in particular have been linked to 15 per cent reductions in absenteeism and increases of between 3 per cent and 20 per cent in productivity. To this can be added significant savings in energy costs achieved by an integrated approach to lighting design.

Variances in individual preference and the growing importance of staff autonomy both point to the value of introducing a means of personal control to the greatest degree consistent with efficient operation of the air conditioning, lighting and related

The impact of design on reducing staff turnover

- Significant reduction in attrition rate (staff turnover) post move

- Training costs average of £13K

- Calls handled per employee
  Pre-move = 35
  Post-move = 74

- 110% increase

building systems. This particularly relates to temperature and lighting, and tolerance to sub-optimal conditions is also increased where individuals have the ability to influence those conditions.

Spatial arrangement

The second major aspect of the way that the workplace aids performance is in supporting work processes through the way that space is arranged. The key factor here is in the balance between private offices and open plan, which itself turns on the balance between concentration/privacy and communication/interaction. Whilst there is a perception that open plan will encourage communication, and whilst it clearly sends a strong message about the presence or absence of organisational hierarchies, no definitive causal relationship has been found between the increased use of open space, increased communication and improved productivity. The conclusion must be that there is no general rule, and that the answer is dependent upon the unique characteristics of individual organisations. The challenge is in balancing an organisation's requirements for both communication and concentration, and devising spaces that can respond to and catalyse the highly complex process of social interaction at work. There is also

a need to balance a paradox: that the best transfers of tacit knowledge tend to be serendipitous, personal and private; yet the best insights need periods of intense and private reflection as well as periods of communal activity.

Even with open plan, there is evidence that the probability of interaction between individuals declines significantly after 50m of separation, and that both horizontal separation, and separation between floors, are obstacles to interaction. Clear visual contact improves interaction, as does easy vertical circulation, and the provision of places for informal encounter. In one study, communication between engineers on separate floors provided with visual contact and easy vertical movement was found to be 14 times higher than in buildings without either.

By contrast, other research shows the importance of quiet spaces for those engaged in tasks that require uninterrupted concentration. In one study, individuals working in quiet spaces achieved 16 per cent higher performance scores in memory tests and almost 40 per cent higher in mental arithmetic tests by comparison with others working in open office environments with significant levels of background noise.

Other studies show significant levels of losttime as a result of interruptions caused by general conversation, and the need for 15 minutes of 'immersion time' before returning to optimum levels of concentration following an interruption.

Attention should also be paid to whether people work individually or in a team, and to the size of that team and its dynamics so that the work setting supports group activity.

The key lesson from this research is that a variety of work settings should be available, based on the activity undertaken by each individual and team, balancing the need for concentration and communication.

If this is not done knowingly, though, it is also possible to produce the worst of both worlds: a setting in which an individual is separated from his work colleagues in a way the prevents interaction, but does not secure privacy or quiet – of which the arch example is the office cubicle from the world of Dilbert.

"A study that considered absenteeism, showed a clear effect in reduced absence from work in a group that had moved to new premises."

The impact of design on reducing absenteeism

- Percentge monthly absenteeism
- Post move to new building
- Compared to 5 other locations

BP Blue Chalk and Sun Microsystems

A field study to test the BP Blue Chalk programme of office design used questionnaire analysis to assess three different types of work space: enclosed (high ownership of cellular space), restack (open plan) and 'Blue Chalk'.

The questionnaire analysis revealed perceived improvement in communication, collaboration, creativity and performance in the third type of layout. Statistically significant benefits were achieved in all four areas: approximately 13 per cent greater performance, 15 per cent greater communication, 18 per cent greater collaboration, and 10 per cent increased creativity.

Sun Microsystems' director of workplace effectiveness reports that the introduction of a variety of settings designed to enhance the informal spread of ideas contributed to a perceived 10 per cent gain in individual productivity and 7 per cent in team productivity; and added that 'even if the amounts are half that, it results in millions of dollars in productivity gains'.

Research findings: branding and external expression

In addition to its impact on health and comfort, and the provision of physical support for work processes, the workplace may also be used as a means of communicating the beliefs and values of an organisation. Such messages are communicated by choice of location, by the way the building and its services are maintained and operated, and through the visual branding of work settings.

Even if basic physical health and comfort needs have been met, and operational performance has been optimised, a workplace can still fail dramatically if it conveys messages which contradict organisational value, with attendant impacts on job satisfaction, productivity, and job retention.

Just as a business can communicate messages internally to its employees through the choices it makes about workplace location, design and operation, so it can communicate messages externally to its customers and the broader public.

The importance that organisations place on using office space to communicate their brand can be expected to increase, as the general public becomes increasingly aware of brands and of the built environment. Currently a belief in the impact that space can have on external stakeholders is the subject of perception and professional consensus rather than hard data. There is a challenge in measuring the value of design, as issues such as corporate identity and branding are intangible. Nonetheless, opportunities for broadcasting external messages through building design are widespread. These include:

• **Location** As for an internal audience, so for an external one, a company's choice of location, the meanings and brand of

the site become interwoven with the priorities and standing of the business. This might be by area association (the Square Mile for finance, Harley Street for medical care); or by virtue of choosing to locate near to competitors or customers

• **Building typology** By choosing a particular form, an organisation transmits messages about its values or aspirations – for example, by opting for the representation of progress, power, aspiration and success associated with a skyscraper; or the more approachable, accessible associations of a corporate campus. Similarly, a business may choose deliberately to go into a high profile, branded, landmark building, or equally deliberately to a lower key, unbranded one

• **Building skin** The building skin also provides an opportunity to transmit an ethos: for example, the progressive image and transparency of glass, or the tradition and solidity of stone. Similarly, by the incorporation of visible means of energy efficiency (solar shading or photovoltaic cells, for example) a business can convey its environmental credentials

• **Scenery and setting** Interior design is also an opportunity to tell a story about a company or its brand, with particular attention paid to the most public interior aspects of a building: the lobby, reception space and public meeting rooms.

The impact of external messages will also be felt by staff and will thus support or contradict internal messages; and lack of alignment between internal and external expression will create negative effects, with staff potentially feeling that outsiders secure better treatment than those who work in the company.

"The importance that organisations place on using office space to communicate their brand can be expected to increase, as the general public becomes increasingly aware of brands and of the built environment."

What remains to be done

More significant than what has been included in the literature are matters that have hardly been touched by research. Topics that are vitally important in contemporary management, such as knowledge management, branding, and corporate culture have rarely been addressed. Much of the work has also focused on individual performance rather than how people work together in groups and teams. This is a critical oversight that should be addressed through a comprehensive research programme exploring aspects of business performance in 'real world' conditions and in organisations that are having to work within a dynamic and often unpredictable global marketplace. This research programme should include practitioners from a wide range of disciplines including design, business, information technology, corporate real estate and human resources; and it should be truly international to capture cultural and regional differences in priorities and approaches to measurement.

So that this additional work builds to a usable body of knowledge that has relevance to a broad audience, there is also a need for the use of settled language and protocols, including:

- an over-arching framework
- a framework and language for the organisation of research, and the analysis of options
- a set of HR metrics for measuring staff performance in general and productivity in particular
- a consistent approach towards the calculation of total occupancy costs
- a protocol for case studies.

The final element of the framework proposed in this report is a call for case studies prepared on a basis consistent with the over-arching framework. Few empirical studies identify how the design and management of the office environment contributes to business performance in the face of competition bearing on post-industrial firms, and this level of experience would be more effectively explored through case studies conducted in accordance with a consistent protocol.

Conclusion

As the majority of work done in organisations moves towards knowledge transaction, we are witnessing a shift of focus from tangible assets to human capital and intangible assets such as research and development, marketing, human resource management, innovation management and branding. This has implications for the workplace. Work environments designed for linear transaction processes are less appropriate than those that support knowledge transfer and connect communities of people and autonomous workers. As work becomes more distributed, technology will play an even greater role, supporting mobility and virtual working, while the individual office building becomes just one part of an organisation's workscape.

The repercussions of this on the subject of 'workplace performance' are potentially profound. If what is presently perceived as the 'workplace' provides accommodation for only half of a person's working week, does this undermine research predicated on the idea of a 9 to 5 day, sat at a fixed, 'owned' workstation?

Such new directions emphasise the need for further research on issues such as workplace connectivity and social network analysis. More understanding is also required of workplace culture, to compare different organisations' cultures through analysis of their unwritten rules, stories and metaphors, and the messages conveyed through their buildings. In particular, there is a need for case studies that analyse the complex decisions and systemically linked data that go into the design and procurement of the modern work environment.

In the rapidly changing world of work, the implications of linking office design with business performance are so profound that innovation is as important in the conduct of research as in the ways that offices are developed, designed and managed.

Footnotes

1 *Working without walls: An insight into the transforming government workplace* (DEGW and OGC, 2004)

2 Building Investment and Decision Support and Occupier.org

3 *Does Property Benefit Occupiers* (Haynes et all, 2000); *To what extent does workplace design and management affect productivity?* (Oseland, 1999); *What's working: Briefing and evaluating workplace performance* (Bradley, 2002); and *Creating the productive workplace* (Clement-Croome, 2000)

Acknowledgements