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Published version

PRICE, Ilfryn and CLARK, Liz (2009). An output approach to property portfolio performance measurement. Property management, 27 (1), 6-15.

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ABSTRACT

Purpose

Research Paper. Demonstrates the analysis of portfolios of office properties using measures of business outputs, namely occupation efficiency and staff satisfaction.

Design/methodology/approach

Satisfaction is measured using a proprietary online survey instrument which has proved highly reliable and repeatable in three separate trials. The data on 192 buildings are analysed using Data Envelopment Analysis

Findings

Instant and significant differences are revealed between clusters of buildings and individual properties. The approach reveals inefficiencies which are concealed by more conventional cost based metrics.

Practical implications

Has proven to be of use gaining organisational commitment to strategic property improvements

Originality/value

The authors are not aware of this approach being applied elsewhere in either research or application.

Key words: Performance measures; Outputs; Occupant satisfaction; benchmarking

1. INTRODUCTION

Charles Goodhart, a former Chief Economic Advisor to the Bank of England, is remembered for his (1974) formulation that that any *"observed statistical regularity will tend to collapse once pressure is placed upon it for control purposes".* Restated, Goodhart's law argues that once an indicator or measure is made a target for the purpose of conducting or influencing policy, then it will lose the information content that would qualify it to play the indicator role. Put even more bluntly people who are measured on Key Performance Indicators have an incentive to play games (Pidd, 2005). The indicator ceases to indicate.

FM in general, and Public Sector FM in particular is overtly focused on the indicator of cost per unit area as the ubiquitous comparator of building performance enshrined in various guides, codes, and benchmarking schemes (Price, 2004; 2007; Pinder and Price, 2005; Hinks et al,. 2007). It easily converts into a target enshrined in policy through many public sector cost comparison schemes. Not surprisingly, especially if budgets are adjusted in light of such targets, managers play games where they can, submitting doubtful returns to such schemes [1] and trimming such activities as maintenance and cleaning. A golden, Goodhartian opportunity to look efficient on such measures is an empty building on which nothing needs spending. It appears in the denominator, area, but not the numerator, cost, and reduces the apparent cost per unit area. The cycle can become a vicious circle. Low quality buildings reduce business performance leading to greater budgetary pressure and even worse performance.

A perfect solution may be impossible, as Goodhart's Law asserts, at least while KPIs are used both as indicators of individual performance and to inform business decisions. A step in the right direction is to at least seek informative indicators. Consider the dilemma

expressed in Figure 1 as what Goldratt (1990 p. 39) would call an evaporating cloud, a format designed to expose underlying assumptions.

FIGURE 1 ABOUT HERE

The delivery of what, in current UK political parlance is termed 'best value' is almost a given. Businesses ignore the equivalent challenge at their peril. The evidence linking high quality space to outcomes, while still less than it might be is growing for schools, (CABE, 2006), offices (Haynes and Price, 2004; Price, 2007), universities (Price et al. 2003) and hospital environments (e.g. Hutton and Richardson, 1995; Miller and May, 2006; May and Pinder, 2008). Such spaces, if they are to be kept in good condition do tend to cost more (per unit area at least); an assertion that should not under value the fact that some facilities management regimes, given the same level of funding, manage to produce different levels of quality (Price and Akhlaghi, 1999; Macdonald 2007; Macdonald et al., *in prep*). A generic solution is to develop measures, or indicators, based on outputs per unit area (Pinder and Price, 2005) that are specific to the sector being examined (Price, 2004; 2007), This paper presents some examples and suggests the unintended, Goodhartian, consequences of ever greater reliance on cost per m^2 as not just an indicator but a target.

In, say, retail environments, business find it natural to consider performance in terms of sales or profits per unit area of shelf space. It is claimed (popular press) that sophisticated supermarkets understand and target sales and profits in four dimensions, including the vertical height of a shelf and the time of year. Other 'businesses' are beginning to consider space in similar terms with some universities now setting income budgets per area of space and some hospital trusts using income per unit area to examine estates strategy (authors' confidential information). For civic offices and the administrative /

policy functions of government departments such an approach is not realistic. The accommodation budget can be less than 1% of the total service budget of a large Council; a lower percentage than is the norm for commercial offices. This paper describes the development and deployment of an alternative approach applicable to such properties. It develops an approach described three years ago (Pinder and Price, 2005) ,refined by three years worth of date gathering, and extended to cover whole portfolios and compare different types of building and Councils.

2. METHOD AND DATA

Overall occupation density, the proportion of space to the number of occupiers, provides a measure of efficiency, especially as most FM costs are driven by the size of the building (Bootle and Kalyan, 2002; Price, 2007) but we required a validated and repeatable measure of assessing average satisfaction with a building so as to test for any trade off between density and staff satisfaction.

Our research centre facilitates a research and development network for Facilities Managers of government buildings. Members are drawn from both national government departments and local authorities. Through this network we devoted two years to surveying occupiers' views on, firstly the importance of and secondly their satisfaction with various aspects of their office environment. The research concentrated on general offices rather than special purpose buildings dedicated to delivery of a particular service ,such as laboratories or libraries. The results of the initial research showed high consistency and correlation (Clark et al., 2004) and informed the design of a simpler 22 item instrument which has now been deployed in five annual surveys. Responding authorities / departments differed in each one. For two years, the questionnaire was deployed as a paper copy. For the last three, a web-based survey has been active.

Occupiers of individual buildings receive an email from their internal FM department asking for participation. Satisfaction is measured on a standard five point Likert scale. Details are available from the authors if required.

The change from paper to the internet was marked by an unexplained and uninvestigated increase the overall average satisfaction reported. Since then the average figure has been remarkably consistent (Table 1). Cronbach Alpha indices of reliability routinely exceed 0.9. Where the same buildings have been sampled in successive years variations of more than 0.05 in an overall score can always be attributed to specific changes during the interval between two surveys.

TABLE 1 ABOUT HERE

We have no control over which departments and authorities participate in a given year. The analysis that follows uses only data from the most recent internet survey of a particular building: a total population of 192 buildings. Our analysis follows the method outlined by Pinder and Price (2005) using Data Envelope Analysis (DEA) to contrast satisfaction and building density. Area is measured as Net Internal (NIA) and is corrected for democratic space (council chambers and support facilities provided primarily for elected representatives) and anomalous space (such as halls used for private / community functions). General meeting, circulation, catering and specialised departmental space is included.

We contrast the weighted ratios of

$$\frac{\text{Full Time Equivalent Staff and (average satisfaction * corrected NIA)}}{\text{Corrected NIA}} \quad [2]$$

The need to normalise satisfaction arises from its being measured on a five point scale, whereas the buildings in the sample range in area over two orders of magnitude. The effect (Pinder and Price, 2005) is to weight measurements of

$$\frac{\text{Full Time Equivalent Staff}}{\text{Corrected NIA}} \quad \text{and} \quad \text{satisfaction}$$

3. RESULTS

3.1 Overall

When a DEA analysis is undertaken on only two possible ratios the 'envelope' (the surface joining the most efficient units in a sample) is two dimensional and can be seen graphically. In a presentation of the results from the overall sample (Figure 1) it is the line joining A, C and B. Building A which happens to have close to a mean occupation density achieves its efficiency rating purely on the basis of satisfaction. Building B, by contrast, which happens to have close to mean average satisfaction, supports more Whole Time Equivalent Staff than any other building in the sample. Building C does reasonably well on both ratios and all the buildings within the right angle triangle whose hypotenuse is defined by the line ACB are likewise performing above the average on both measures: that is they are both efficient and effective.

FIGURE 2 ABOUT HERE

The relative DEA efficiency of any other building can be scaled along a line from the origin to the nearest point on the envelope, here illustrated by building D which is approximately 65% as efficient as it could theoretically be. The calculation was performed to allocate as much improvement as possible to reducing inputs; that is the efficiency gain for building D would require a theoretical reduction in space of 35% or an increase in both staff numbers and average satisfaction.

In the individual case of Building D several factors might of course contribute to its relative inefficiency. We return to these below. Overall however the distribution of the histogram of relative efficiencies (Figure 2) shows that most buildings in the sample are less than 80% as efficient as the best performers; a finding which aligns with Bootle and Kalyans' (2002) calculations in respect of commercial offices.

FIGURE 3 ABOUT HERE

3.2 Comparing similar portfolios

FIGURE 4 ABOUT HERE

The results acquire greater relevance for business managers and estates strategists when similar portfolios are compared (Figures 4 & 5). Figure 4 illustrates the civic accommodation portfolios of three large city councils in the UK. The envelope changes as it is recalculated by reference to only the subset of the data. In the case of Council D, only two buildings in the portfolio were submitted. In the case of the other three authorities, the data extend to the major part of their office portfolio. The ellipses enclose the properties belonging to particular authorities. Council C has recently rationalised its portfolio into modern offices with predominantly open accommodation and a degree of flexible, shared desk working. Council B is in the throes of doing the same but has been hesitant about moving to desk sharing. Councils A and D have not yet modernised their portfolio, though the evidence of the diagram has persuaded them of the need to do so.

Councils A and B were used by Price (2007) to demonstrate the pit falls of performance management on the basis of cost per m^2. B's offices cost on average 13% more per square metre than A's (using a rigorous cost comparison which includes a notional rent for owner occupied property). However because B uses 20% less space per person and has

fewer back office staff in relation to total turnover, the overall cost to the Council as a percentage of total turnover is nearly 25% less. Their accommodation is noticeably leaner than A's, with higher staff satisfaction.

FIGURE 5 ABOUT HERE

Figure 5 shows a comparable comparison for FOUR County Councils. In this case the authorities concerned have not chosen to also benchmark operating costs. What is immediately apparent is the overall efficiency achieved by Council Y who have modernised their portfolio. Also of interest is the contrast between Z1, a group of buildings which have been refitted to modern standards, and Z2, a portfolio where the relevant director has so far resisted pressure to modernise the office and sacrifice traditional cellular space. As the director of Corporate Property remarked when shown this diagram, it provided the perfect evidence to rebut his colleague's arguments.

3.3 Comparing similar buildings

FIGURE 6 ABOUT HERE

The approach also allows for the comparison of similar buildings. Figure 6 illustrates all the county, shire, city or town halls in the sample and the London headquarters of one national department. There is a degree of contrasting different buildings in that the more efficiently occupied ones do tend to be modern whereas the sample also includes a number of listed Victorian halls whose floor plate is less conducive to modern office practices. The area data have however been corrected for democratic space so the comparison is addressing office accommodation and there are clear signs of inefficiency (an attachment to large single offices) in the buildings which tend to house the more senior officers of a particular council. A number of the buildings in this sample also

achieve low overall satisfaction scores; an observation that the researchers have not had the opportunity to investigate further.

3.4 Comparing a single portfolio

Finally (Figure 7) the total portfolio of a particular authority can be analysed to highlight the relative performance of each building and the notional reduction in space, or increase in outputs that would be needed to raise a particular property (Figure 8) to an equivalent level of efficiency to the best buildings in a particular portfolio.

FIGURE 7 ABOUT HERE

FIGURE 8 ABOUT HERE

GENERALISING

The analyses reported here provide quick, economical, 'at a glance' comparisons of the performance of individual buildings and of portfolios relative to various possible peer groups. They show that performance from the occupier's perspective. How well are buildings being used? How satisfied are staff relative to a statistically established average?

The same calculations reveal a waste of space, typically more than 20% in most of the properties compared. While constraints of building design may contribute the spacatial layout, utilisation must be a major cause. In many cases, buildings represent an excessive and underutilised asset. In others it may mean the occupier is leasing more space that they need, or would need if they addressed inefficient utilisation. In either case the potential saving or capital release is likely to be much more significant than could be achieved by small reductions in operating costs. Indeed underlying the theoretical perspective advocated above is the contention that not only does reliance on Cost per unit area not reveal portfolio level inefficiencies, it may actually exacerbate them. In the terms used by

Blyth and Worthington (2001 p.9) the bigger benefits are in managing building demand rather than building supply. The ‘paradigm paralysis' (Hinks et al. 2007), facilities and property managements’ obsession with input based metrics, is avoidable. Ouput-based approaches yield a new language for new, leaner (Price, 2007) asset portfolios.

ACKNOWLEDGEMENTS

The project was sponsored over a period of five years by our centre’s Government Network. We thank Dr James Pinder for useful discussions in formulating the ideas presented.

NOTES

1. Chatham House rules discussions on ERIC, EMS etc.
2. A statistical device to enable the programme to analyse pure satisfaction data. DEA is designed to work with ratios.

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Year	Method	Sample size respondents	Sample buildings	Average satisfaction
1	Paper	2341	69	2.90
2	Paper	2201	78	2.992
3	Internet	4918	95	3.255
4	Internet	1965	68	3.26
5	Internet	4715	83	3.25

Table 1: Comparison off five years sampling

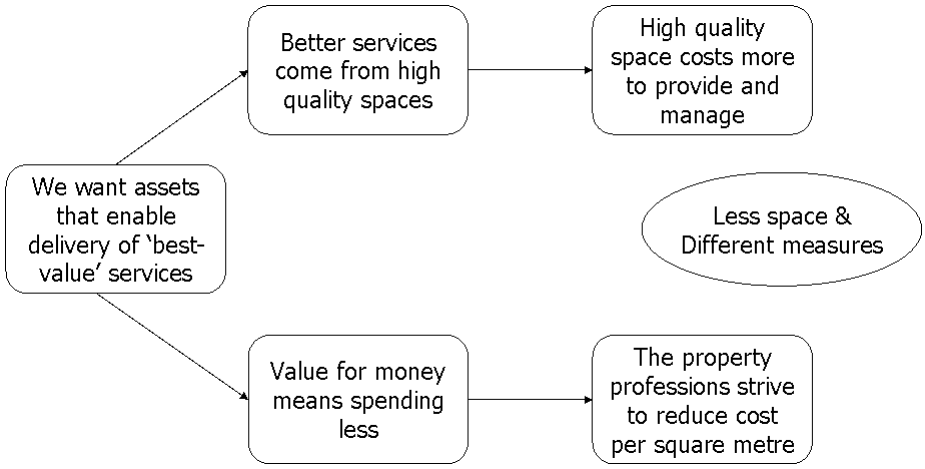

Figure 1 The value for money dilemma

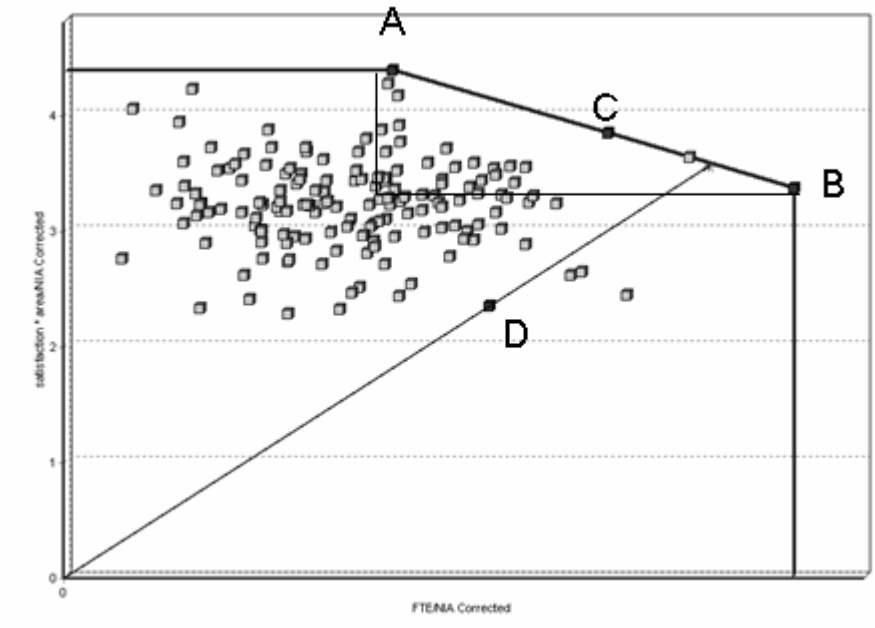

Figure 2 Computation of the relative efficiency of all properties in the sample. Methodology described in detail by Pinder and Price (2005)

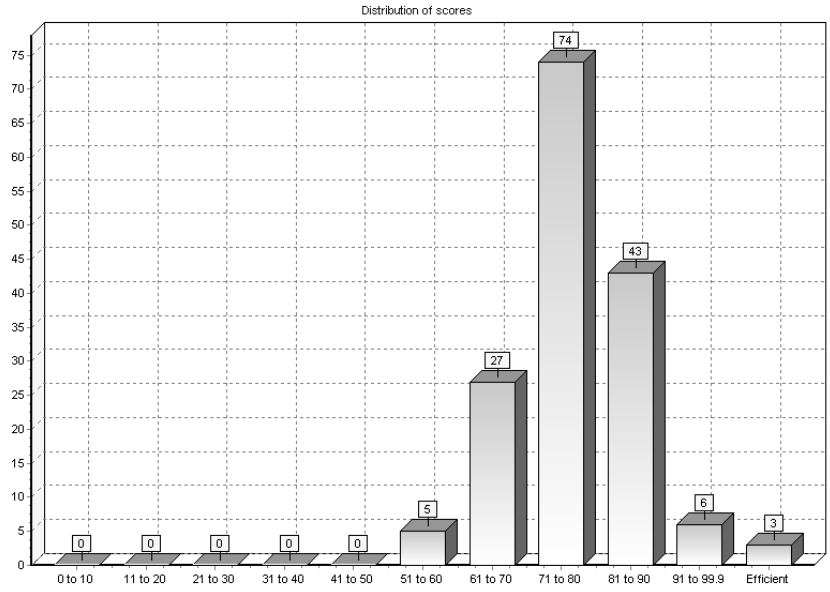

Figure 3 Histogram of the relative efficiency of all the samples in Figure 1. Efficiency in DEA is computed as the relative distance from the envelope of the best performing units in the sample.

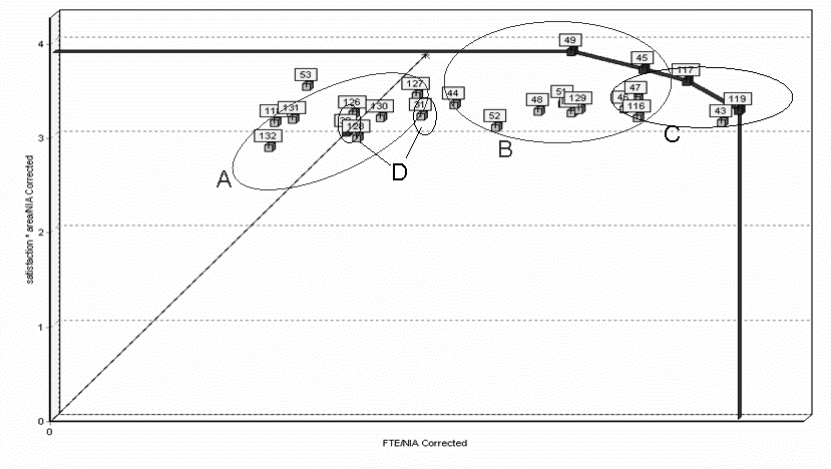

Figure 4 An analysis on the same criteria as in Figure 1 of the civic accommodation portfolios of four large City Councils in the UK

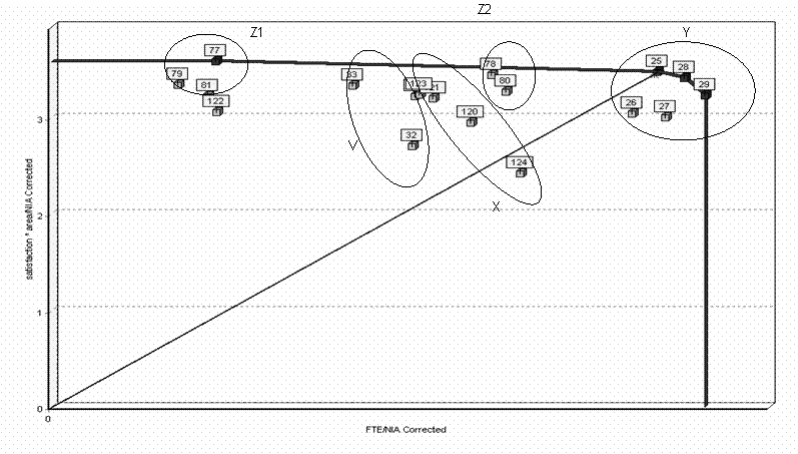

Figure 5 As Figure 3 for the portfolios of four County Councils

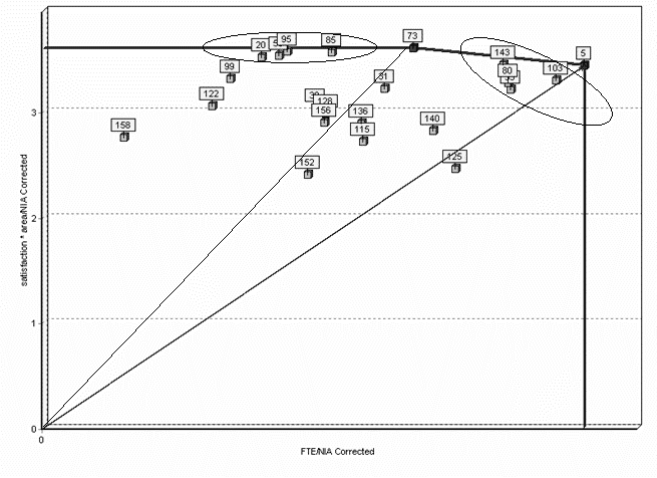

Figure 6 A DEA analysis for all the identified halls and HQ buildings in the sample set.

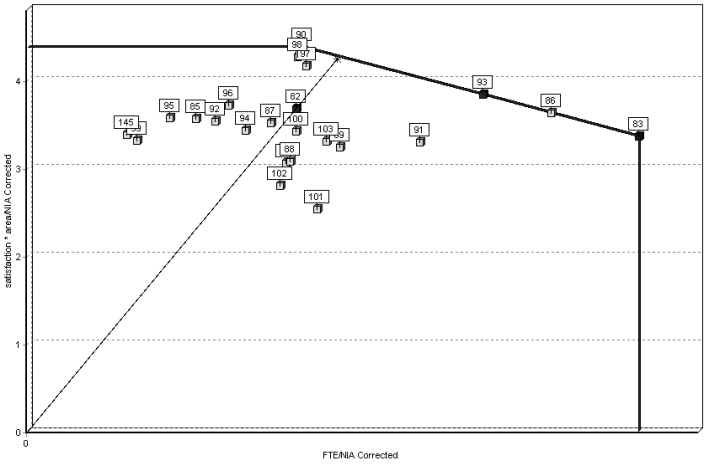

Figure 7 A DEA analysis for all the buildings used by one Local Authority

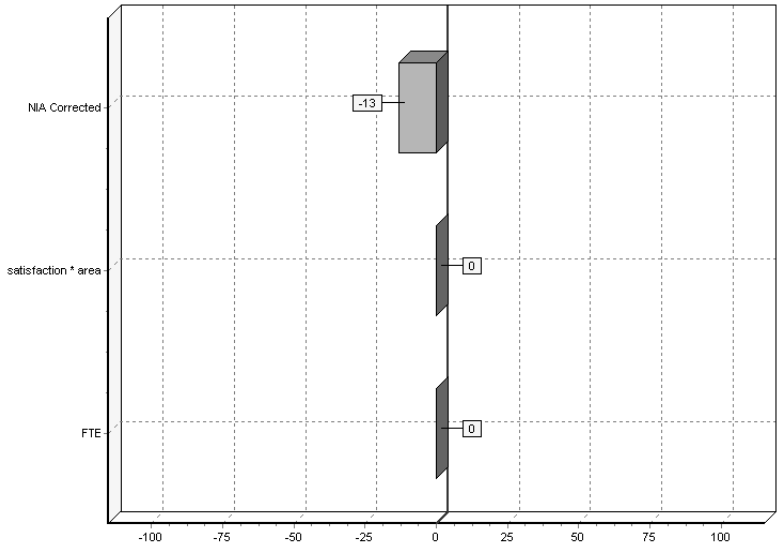

Figure 8 The improvement profile, based on input minimisation that would be need to bring the property highlighted in Figure 6 to the nearest position on the envelope. In this case the Net Internal Area is 13% larger than the occupancy density or satisfaction would suggest.