

**Measurement and benchmarking of workplace performance
Key issues in value adding management**

Voordt, Theo J.M.van der; Jensen, Per Anker

DOI

[10.1108/JCRE-10-2017-0032](https://doi.org/10.1108/JCRE-10-2017-0032)

Publication date

2018

Document Version

Accepted author manuscript

Published in

Journal of Corporate Real Estate

Citation (APA)

Voordt, T. J. M. V. D., & Jensen, P. A. (2018). Measurement and benchmarking of workplace performance: Key issues in value adding management. *Journal of Corporate Real Estate*, 20(3), 177-195.
<https://doi.org/10.1108/JCRE-10-2017-0032>

Important note

To cite this publication, please use the final published version (if applicable).
Please check the document version above.

Copyright

Other than for strictly personal use, it is not permitted to download, forward or distribute the text or part of it, without the consent of the author(s) and/or copyright holder(s), unless the work is under an open content license such as Creative Commons.

Takedown policy

Please contact us and provide details if you believe this document breaches copyrights.
We will remove access to the work immediately and investigate your claim.

Measurement and benchmarking of workplace performance: key issues in value adding management

To cite this document:

Theo J.M. van der Voordt, Per Anker Jensen, (2018) "Measurement and benchmarking of workplace performance: key issues in value adding management", *Journal of Corporate Real Estate*, 20(3), 177-195.
DOI: <https://doi.org/10.1108/JCRE-10-2017-0032>

Abstract

Purpose: This paper presents a process model of value adding corporate real estate and facilities management. It aims to identify which indicators can be used to measure and benchmark workplace performance and the added value of workplace interventions for an organisation.

Theory: In order to add value to an organisation, workplaces have to provide value for money by a positive trade-off between the benefits, i.e. support of the organisational objectives and the primary processes, and the costs, time and risks connected with achieving these benefits. Widely used indicators to measure the costs are the investment costs, running costs, and the Total Cost of Occupancy. These metrics are primarily connected to efficiency i.e. to optimal use of the resources of a firm, but much less to effectiveness and benefits such as user satisfaction, productivity, health and well-being.

Design/methodology/approach: The paper compares performance measurement and benchmarking theory with empiric data from different work environments. The paper mostly builds on two books on adding value through buildings, facilities and services, both edited and co-authored by the authors of this paper. The books were based on literature reviews, interviews with practitioners, cross-border studies of performance measurement and benchmarking, and in-depth analyses of various value parameters by experts from different countries. In addition, theory and empirical examples of benchmarking have been included in the paper.

Findings: The paper presents 12 value parameters that are seen as relevant in measuring and benchmarking of workplace performance: four people oriented, four business processes related, two economic and two social parameters. Because not all values can be easily expressed in monetary units, various other ways of measuring are presented that can help to monitor and to benchmark workplace performance. The twelve values and ways to measure can be used to support a more integrated business case approach that goes beyond “dollar-metrics” and spreadsheet based decision-making. Both quantitative and qualitative performance indicators and including both hard and soft factors are needed to define the trade-off between the costs and benefits of interventions in corporate real estate, facilities and services, and to cope with the interests and needs of different stakeholders.

Originality/value: The paper links performance measurement and benchmarking to value adding corporate real estate and facilities management and presents new ways to measure and benchmark the performance of buildings, facilities and services in connection to organisational performance.

Keywords Performance measurement, Benchmarking, Workplace, KPIs, added value, business case

1 Introduction

Buildings, facilities and services are important resources to facilitate the primary (business) processes of an organisation. Corporate real estate is often referred to as the fifth resource, in addition to capital, human resources, information and technology (Joroff et al., 1995). Corporate real estate management (CREM) aims to align the portfolio and services to the needs of the core business, in order to obtain maximum added value for the business and to contribute optimally to the overall performance of the organisation (Dewulf et al., 2000). In EN 15221-1, facilities management (FM) is defined as the integration of processes within an organisation to maintain and develop the agreed services, which support and improve the effectiveness of its primary activities (CEN, 2006). In the new ISO standard, FM is also linked to quality of life (ISO, 2016). Another related concept is usability, which may be defined as a combination of effectiveness (providing the right output), efficiency (using the right input) and satisfaction or experience of clients, customers and end users (Alexander, 2005). See also ISO 9241-11:1998, Ergonomic requirements for office work with visual display terminals (VDTs) – Part 11: Guidance on usability, and ISO 9241, Ergonomics of human-system Interactions.

In both definitions of CREM and FM, supporting (business) processes and adding value to the organisation are key concepts. This paper takes a starting point in a newly developed process model of value adding corporate real estate and facilities management. It aims to identify and discuss, which indicators can be used to measure and benchmark workplace performance and the added value of workplace interventions for an organisation. The paper compares performance measurement and benchmarking theory with empiric data from different work environments.

The paper mostly builds on two books on adding value through buildings, facilities and services, both edited and co-authored by the authors of this paper (Jensen et al., 2012; Jensen and Van der Voordt, 2017). The books were based on literature reviews, interviews with practitioners, cross-border studies of performance measurement and benchmarking, and in-depth analyses of various value parameters by experts from different countries. The empirical basis has been a combination of qualitative and quantitative methods. The aim of this international collaboration has increasingly become more normative towards providing research based guidance to practice. This has been further underlined by including theory and empirical examples of benchmarking in this paper.

2. Value adding FM and CREM

Figure 1 presents the new Value Adding Management (VAM) model that has been developed to support decision-makers to define and implement FM or CREM interventions that create a positive trade-off between the benefits and the costs and as such add value to the organisation (Hoendervanger et al., 2017). This process model includes four steps that were adopted from the well-known Deming cycle: Plan-Do-Check-Act..

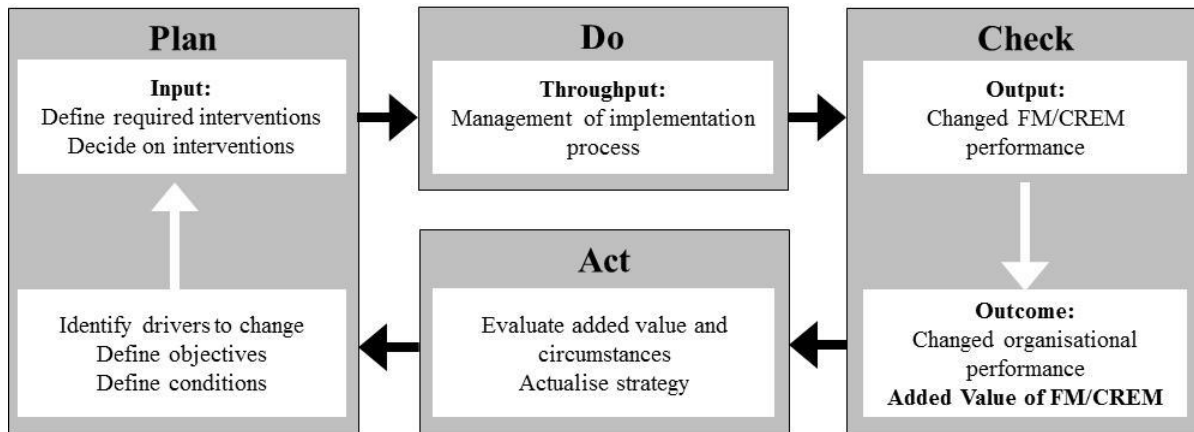


Figure 1: Value Adding Management model (Hoendervanger et al., 2017)

The main actions in the *Plan-phase* are 1) to identify the drivers to change i.e. to define if there is a gap between the desired and actual performance of the organisation and the role of the accommodation, facilities and services, and 2) to define which interventions may result in improved performance, and whether the benefits outweigh the costs and sacrifices. The *Do-phase* encompasses the implementation of the proposed interventions and management of the change process. In the *Check-phase* the costs and benefits of the intervention(s) and its impact on the performance of the organisation has to be measured. To be able to measure whether the performance has improved, an ex-ante measurement before the intervention is implemented is needed as well (baseline measurement). A distinction is made between the *output* of the change process, i.e. the change in CREM/FM performance (for instance less m² per person, a reduced CO₂ emission, or lower facility costs), and the *outcome* of the change process, i.e. whether the changed FM/CREM performance fits with the organisational strategy, mission, vision and objectives and as such adds value to the organisation and its customers and end users. For example, if the objective of the organisation is to be as green as possible and to perform on a high level of social responsibility, a further reduction in energy consumption adds value to the organisation, whereas if the organisation just aims to fit with the current legislation and the performance assessment in the Plan-phase shows that it already fits with the legal requirements, being “more green” does not add value to the organisation (though it is very welcome from a societal point of view!).

The distinction between output and outcome is related to the basic distinction in Michael Porter's value chain (Porter, 1985) between support activities and primary activities, which is also reflected in the management model in EN 15221-1 (CEN, 2006). FM/CREM as support activities deliver value to the primary activities, and the primary activities create value for the organisation by delivering value to customers and other stakeholders.

It is also important to check which FM/CREM interventions result in synergy, i.e. improve the outcome regarding more than one value parameter, and which ones may result in conflicting outcomes, e.g. a higher profit but a lower level of employee satisfaction due to a reduction in m² per employee. Figure 2 shows examples of input -> output -> outcome / added value chains to illustrate the complexity of cause-effect relationships between interventions, FM/CREM performance, and organisational performance (Hoendervanger et al., 2017).

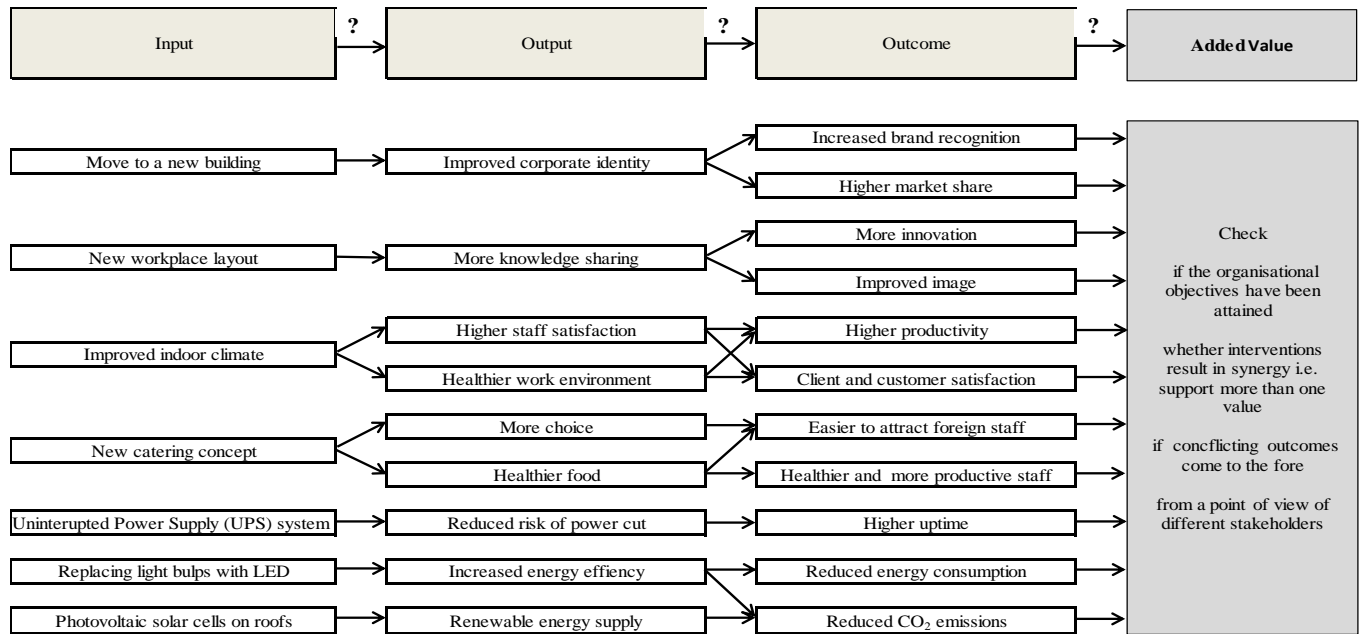


Figure 2: Examples of input -> output -> outcome -> added value chains

When all objectives have been attained, the *Act-phase* may be limited to consolidation of the new situation, until new drivers to change come to the fore. If the objectives are not sufficiently attained, or if too many negative side effects come to the fore, new interventions or strengthening of earlier interventions should be considered. Another option is to reconsider the objectives; maybe the aimed performance was not realistic and feasible within the current conditions. If new or revised interventions have to be implemented, the Plan-Do-Check-Act-phases start again. A further elaboration of the four steps and tools to support each step can be found in Hoendervanger et al., 2017; Van der Voordt et a. 2016).

The next sections elaborate the Check-phase. This is the phase where performance measurement and benchmarking are in focus. We discuss how to measure the output and outcome of FM and CREM interventions and the role of benchmarking and how practice copes with these topics. The empiric data all focus on work environments. We reflect on current omissions, resulting in a proposal for a new benchmark framework with twelve value parameters and suggestions how to measure these values. The proposed value parameters and ways to measure can be used as input to integrated business cases that incorporate both monetary and non-monetary performance indicators.

3 Performance measurement: aims, areas and indicators

Performance measurement is a prerequisite to know how well people or facilities perform. Sinclair and Zairi (1995) provided a list of seven topics to emphasize the need for performance measurement as a means to:

- Enhance improvement
- Ensure that managers adopt a long-term perspective
- Make communication more precise ('say it in numbers')

- Help an organisation to allocate scarce resources to most appropriate interventions
- Create an effective and efficient planning, control, or evaluation system
- Motivate people to achieve targets and encourage right behaviour
- Support management initiatives and managing change

Parker (2000) mentioned both similar and additional reasons such as 1) to identify success, 2) to identify whether the organisation meets customer requirements, 3) to better understand their processes, 4) to identify problems, bottlenecks, waste and necessary improvements, and 5) to ensure that decisions are based on facts instead of (or in addition to) assumptions, expectations, emotion or intuition.

Nowadays many conceptual frameworks, measurement systems and performance indicators are available (Riratanaphong, 2014). Keegan et al. (1989) made a distinction between cost and non-cost indicators and internal versus external indicators. Sink and Tuttle (1989) identified seven interrelated performance criteria: 1) effectiveness, 2) efficiency, 3) quality, 4) productivity, 5) quality of work life, 6) innovation, and 7) profitability. The Triple-P model of Tangen (2005) relates efficiency to input and effectiveness to output, and connects performance to productivity (defined as the ratio between output and input), profitability, and performance indicators such as quality, delivery, speed, and flexibility. The model in Figure 1 is also based on the relationship between input and output and adds outcome as an additional way to assess the result of a change process called throughput.

According to the Balanced Scorecard (BSC) of Kaplan and Norton (1992) and the related Strategy Map (Kaplan and Norton, 2004), organisational performance should be evaluated from four perspectives: 1) Financial: profitability, revenue, sales growth; 2) Customer: customer retention, customer satisfaction, market research; 3) Internal business processes: processes to meet or exceed customer expectation; and 4) Learning and growth: how to grow and meet new challenges. Bradley (2002) classified various performance criteria into six perspectives of business performance according to the BSC concept: 1) financial health and 2) cost efficiency (financial perspective), 3) stakeholder perception (customer perspective), 4) organisational development and 5) environmental responsibility (internal business process perspective), and 6) productivity (learning and growth perspective), see appendix 1.

Lavy et al. (2010) allocated building and facilities related performance indicators to four categories: 1) financial indicators (all kinds of costs), 2) physical indicators (e.g. physical conditions of the building, health and safety, resource consumption), 3) functional indicators (such as productivity, parking, staff turnover and adequacy of space), and 4) survey-based indicators (such as data from employee or customer satisfaction surveys). As such they present a mix of FM/CREM performance indicators and business performance indicators. So far, no consensus comes to the fore about which system is most appropriate and which Performance Indicators are key, why, for whom and for what purpose.

4 Benchmarking

A useful way to evaluate the outcomes of interventions is to compare the applied Key Performance Indicators (KPIs) with similar data from before the interventions were implemented and data from other units within the same organisation (internal benchmarking) and data from other organisations

(external benchmarking). Since the early 1990s benchmarking associations for FM/CREM have been established in several European countries by professional bodies, consulting companies and research institutions. The dominating focus in all countries has been cost/m² and/or cost/person for different types of facilities and services. The European FM network EuroFM initiated a FM benchmarking project in 1997 to support cross-border benchmarking. It was soon realized that the way to define and structure essential items such as cost and space measurements varied too much between countries to make cross-border data benchmarking reliable. Instead, it was decided to make a process benchmarking of the different national benchmarking systems. The final report presented a comparison of the systems in Austria, Denmark, Finland, Norway, the Netherlands and the UK (EuroFM, 2001).

In 2002, a European collaboration was initiated to develop FM standards in order to establish a common basis for benchmarking in Europe.

The European FM standards published from 2006 to 2012 cover 7 standards. The first 6 standards created the foundation for benchmarking, while the latest standard EN 15221-7 specifically concerns benchmarking (CEN, 2012). EN 15221-7 defines benchmarking as the process of “comparing strategies, processes, performances and/or other entities against practices of the same nature, under the same conditions and with similar measures” (CEN, 2012). This standard relates the content of benchmarking to strategy, process and performance. All three types of benchmarking can serve the purpose of identification of improvement options. Strategic benchmarking can also support resource allocation decisions, identification of best practices, budget review and planning, and alignment with corporate objectives. Process benchmarking can further support prioritisation of problem areas, verification of legal compliance, identification of best practices, and improvement of process effectiveness. Performance benchmarking can also support prioritisation of problem areas as well as assessment of various aspects of property performance. The triplet seems to reflect the development in FM from a narrow focus on cost reduction to a broader and more strategical orientation with increasing focus on adding value. The first two European standards EN 15221-1 and 2 published by the European standardisation organisation CEN have been replaced by two global ISO standards in 2017 published by the international standardisation organisation ISO.

The benchmarking standard presents different types of benchmarking differentiated according to content (strategy, process, performance), measures (quantitative and/or qualitative), comparator (internal, competitor, cross-sector), domain (local, national, international) and frequency (one-off, periodic, continuous). In literature there is also mentioning of a comparator called “one against many”, where an organisation conducts benchmarking of own FM or CREM performances against a database with benchmarking data from a large group of other organisations (Jensen, 2008; Wauters, 2005; Kimmel, no year). In order to define the *added* value of any FM or CREM intervention, benchmarking before and after an intervention is important as well (Jensen and Van der Voordt, 2015). EN 15221-7 defines a number of benchmarking outputs divided in 6 areas, see Table 1.

Table 1: Benchmarking outputs (based on CEN, 2012)

| Area | Indicators |
|-----------------|---|
| Financial | Annual costs per Full Time Equivalent (FTE), workspace and/or m ² Net Floor Area (NFA) |
| Spatial | NFA per FTE, person or workstation NFA, Internal Area and/or Gross Floor Area divided by Total Level Area |
| Environmental | CO ₂ emissions in total, per FTE and/or per m ² NFA measured in tonnes per annum Energy consumption in total, per FTE and/or per m ² NFA measured in kWh per annum Water usage in total, per FTE and/or per m ² NFA measured in m ³ per annum Waste production in total, per FTE and/or per m ² NFA measured in tonnes per annum Other environmental scores |
| Service quality | Quality of FM and/or specific services |
| Satisfaction | Satisfaction with FM and/or specific services |
| Productivity | Core operating hours of facility (facility management related) Timeliness of service provision (facility management related) Uptime facility (business continuity related) Recovery time (business continuity related) Staff turnover (human resources related) Absenteeism (human resources related) |

Furthermore, the benchmarking standard gives guidance to facilities managers on how to conduct benchmarking and presents a process with three phases: preparation, comparing and improving. with a sub-division in 10 steps, see Table 2. Besides, the standard include a number of annexes about how to collect data, inherent complications and risks, and benchmarking examples.

Table 2: Benchmarking process (based on CEN, 2012)

| Phase | Step |
|-----------|--|
| Preparing | 1. Set objectives (purpose and scope) 2. Define methodology (indicators and benchmarks) 3. Select partners (peers and code of conduct) |
| Comparing | 4. Collect data (collect and validate) 5. Analyse data (determine and normalize) 6. Determine gaps (compare and explain) 7. Report findings (communicate and discuss) |
| Improving | 8. Develop action plan (tasks and milestones) 9. Implement plan (change and monitor) 10. Process review (review and calibrate) |

5 Benchmarking in practice: prioritised values and performance measures

5.1 Prioritised values

In order to explore which values and performance indicators are prioritised in practice, a series of 10 interviews was conducted with 5 practitioners in the Netherlands and 5 practitioners in Denmark – all from private companies (Van der Voordt and Jensen, 2014). The findings showed a huge variety, both in prioritised performance areas and related indicators, see Table 3. Values related to satisfaction and cost were most frequently prioritized, with satisfaction ranked as more important than cost in Denmark and the other way around in the Netherlands. Productivity was also important, in particular in Denmark. Values in relation to adaptation and environmental values were also mentioned in both countries, while culture was only represented in the Netherlands.

Table 3: Prioritised values from ten interviews with practitioners

| | 1 st | 2 nd | 3 rd | 4 th | 5 th |
|-----|---|--|--|---|------------------------------------|
| DK1 | Transparency of cost and priorities | Scalability | Release management resources | User satisfaction | Satisfaction with service provider |
| DK2 | Core Business objectives | Innovation | Coherent strategy between Core Business and FM | Productivity of Core Business | Communication |
| DK3 | Create time | Create well-being | | | |
| DK4 | Satisfaction of outsourced staff | Make processes smarter | Improvements and innovation | User centricity and service orientation | Corporate Social Responsibility |
| DK5 | Increase energy conscience, reduced CO2 emissions | Ease of operation | Deliver better service with less or the same cost | Satisfaction | |
| NL1 | Profit (ebit); improving cash position | Cost reduction | Transparency of Real Estate data for shareholders | | |
| NL2 | Cost reduction | Affordability | | | |
| NL3 | Sustainability | Cost reduction | Identity | Satisfaction | |
| NL4 | Cost reduction | Improving Core Business / Productivity | Health | | |
| NL5 | Efficient use of space | Forecasting future m2-needs | Balance between owned, rented, and sale and lease back | Forecasting of future capital need | Engagement |

A recent survey among the members of the international corporate real estate association CoreNet Global showed that cost reduction, increasing employee efficiency and productivity, and enhancing flexibility are most highly prioritised, both in 2010 and in 2016 (Nase et al., 2017), see Table 4.

Table 4: Comparison of two CoreNet Global member surveys on prioritised values

| | 2016 Survey | | | 2010 Survey ³ | | | Rank change |
|---|-----------------------|------|----------------|--------------------------|------|-----|-------------|
| | GM Value ¹ | Rank | N ² | GM Value | Rank | N | |
| CREM strategy | | | | | | | |
| Reducing real estate costs | 2.38 | 1 | 229 | 2.22 | 1 | 213 | = |
| Increasing employee efficiency and productivity | 2.52 | 2 | 231 | 2.98 | 2 | 191 | = |
| Enabling flexibility | 2.61 | 3 | 227 | 3.30 | 3 | 194 | = |
| Enhancing employee well-being and satisfaction | 2.69 | 4 | 230 | 3.86 | 5 | 185 | +1 |
| Encouraging and supporting employee innovation and creativity | 2.87 | 5 | 231 | 3.80 | 4 | 179 | -1 |
| Promoting marketing, sales and organisational brand | 2.98 | 6 | 230 | 4.41 | 7 | 201 | +1 |
| Supporting environmental sustainability | 3.22 | 7 | 231 | 4.02 | 6 | 203 | -1 |
| Increasing the value of the organisation's real estate assets | 3.77 | 8 | 231 | 4.51 | 8 | 179 | = |

1) GM = Geometric mean (average) of individual response scores; 2) N = Number of respondents;

3) Figures from Table 5 in Gibler and Lindholm (2012, p. 43)

A comparative analysis of various studies in the health care sector showed that also in this sector cost and productivity rank highest, with satisfaction at the third place (Van der Voordt, 2016).

5.2 In search of the trade-off between benefits and costs and related benchmark data

Remarkably, many organisations that adopt new workplace practices like New Ways of Working and activity-based workplaces (i.e. sharing a variety of task-related workplaces) mainly focus on the benefits, whereas adding value includes the trade-off between benefits and costs. Table 5 gives an overview of possible costs and benefits of activity-based workplaces, monetary and non-monetary (Van der Voordt, 2003).

Table 5: Possible benefits and costs of adopting activity-based workplaces

| Possible benefits / Main drivers to change | Possible costs and risks |
|---|--|
| <ul style="list-style-type: none"> • Better communication and collaboration (due to openness) • Increased productivity • Lower costs due to efficient use of space and resources • Flexibility in the use of space • Support of culture change (by more social interaction) • Increased job satisfaction due to more autonomy and dynamics • Attracting/retaining young talent and more customers due to a positive image of a creative, innovative and supportive work environment • Contribution to a sustainable environment | <ul style="list-style-type: none"> • Costs of changing the environment • Costs of implementation • Resistance to change -> lower employee satisfaction -> loss of productivity, increased sick leave • Reduced job satisfaction due to the loss of status, privacy, territory or identity • Loss of social cohesion and team spirit • Lack of privacy • Loss of productivity due to distraction by phone calls, too much communication, changing places |

Regarding performance measures, most attention is paid to cost data and m² data. One of the leading FM Benchmarks in the Netherlands is the Netherlands Facility Cost index (Netherlands Facility Cost Index Coöperatie u.a., 2017). It shows that in 2016 the median costs per m² rentable floor space of facilities in Dutch offices was € 461, VAT not included. This is 1.8% more than in 2015, but 9% less than in 2003. The median number of m² rentable floorspace per workspace is 19.8 m². The median numbers are also shown for different building, ranging from < 5,000 m² till > 20,000 m² rentable floorspace. The average flex-ratio (number of work spaces per fte.) is 0.94. The NFC does not yet make a distinction between traditional workspaces and flexible workspaces. In a professional paper by Van 't Spijker and Van der Meer (2010) it is shown that the costs of activity-based workspaces per headcount per year are much lower in comparison to traditional workplaces personal desks, se Table 6.

Table 6: Benchmark data concerning different workplace solutions and sectors from the Netherlands

| | Traditional | New Ways of Working | | |
|--|-------------|---------------------|-------------|-------------|
| | | Municipalities | Non-profit | Commercial |
| Flex-ratio | 100 % | 70-80 % | 70-80 % | 50-70 % |
| Gross Floor Area (GFA) per workplace | 22-28 | 19-21 | 21-24 | 18-21 |
| GFA office area per workplace | 16-22 | 13-15 | 14-18 | 12-16 |
| Investment costs per m ² GFA | 3,100-4,200 | 3,500-4,500 | 3,300-4,500 | 3,700-5,200 |
| Accommodation costs per m ² GFA | 300-350 | 330-370 | 310-370 | 400-450 |
| GFA per headcount | 22-28 | 15-22 | 15-22 | 13-20 |
| Accommodation costs per headcount per year | 6,000-7,800 | 4,400-5,200 | 4,300-5,200 | 4,000-4,900 |

However, also possible negative impacts should be taken into account. Based on a huge number of case studies, Brunia (2016) found that on average the architecture and interior design of activity-based work settings is more appreciated than in traditional offices (probably due to its younger age), whereas privacy, opportunities to concentrate, storage facilities, acoustics and perceived support of one's own productivity is more than 10% less in activity-based work settings than in traditional cellular offices, see Table 7.

Table 7: Dutch data on employee (dis)satisfaction in traditional and activity-bases work settings

| | Traditional offices with personal desks | Activity-based work settings | Traditional offices with personal desks | Activity-based work settings |
|---|---|------------------------------|---|------------------------------|
| | 43 cases | 68 cases | 43 cases | 68 cases |
| | N = 7,707 | N = 12,385 | N = 7,707 | N = 12,385 |
| | Satisfied | Satisfied | Dissatisfied | Dissatisfied |
| Organisation | 66 | 65 | 10 | 12 |
| Work (content, complexity) | 83 | 79 | 5 | 6 |
| User involvement | 46 | 40 | 19 | 27 |
| Accessibility of the building | 79 | 79 | 10 | 11 |
| Architectural appearance of the building | 42 | 64 | 30 | 11 |
| Number and diversity of places and spaces | 42 | 46 | 27 | 29 |
| Spatial onfiguration of workplaces | 53 | 53 | 18 | 20 |
| Openness and transparency | 50 | 53 | 18 | 23 |
| Workplace comfort | 58 | 54 | 22 | 25 |
| Interior design | 37 | 58 | 33 | 20 |
| Privacy | 50 | 29 | 24 | 44 |
| Opportunities to concentrate | 46 | 33 | 34 | 45 |
| Opportunities to communicate | 71 | 69 | 10 | 12 |
| Storage space | 42 | 32 | 22 | 33 |
| IT facilities | 56 | 52 | 19 | 22 |
| Provided facilities | 53 | 54 | 14 | 14 |
| Indoor climate | 36 | 35 | 42 | 42 |
| Light | 55 | 60 | 19 | 16 |
| Acoustics | 46 | 38 | 22 | 35 |
| Opportunities for remote working | 47 | 54 | 21 | 18 |
| Perceived support of productivity | Supportive | Supportive | Not supportive | Not supportive |
| Own productivity | 46 | 36 | 19 | 30 |
| Team productivity | 43 | 36 | 17 | 26 |

5.3 Benchmarking of workplace performance in 3 cases

In his PhD study, Riratanaphong (2014) explored which workplace performance areas are being used in two office organisations in Thailand and one case from The Netherlands. This study showed that in practice a huge variety of performance measurement topics is used. The data on performance measurement was collected from company reports and interviews with the case organisation's representatives. The impact of workplace change on employees' appraisal was examined by an external researcher using the work environment diagnosis instrument (WODI) that records employee satisfaction, perceived productivity support by the work environment, and prioritised aspects (Maarleveld, et al., 2009). The empirical data has been compared with the criteria from the six perspectives mentioned by Bradley (2002) and the seven performance criteria that were identified by Sink and Tuttle (1989), see Appendix 1 and 2.

Most performance criteria found in the case studies are measured by cost data such as operational cash flow (efficiency), quality management indicators (quality) and economic profits/earnings (profitability). However, the three case studies also included several performance criteria and performance measures beyond cost efficiency. All performance criteria that were mentioned by Bradley (2002) and by Sink and Tuttle (1989) showed up to be included in all three cases, be it with different interpretations and in different ways. The different applications might be due to

different organisational contexts (i.e. business type, objectives, structure) and different external contexts. None of the organisations assessed the impact of their real estate on organisational performance by collecting data before and after the change, with one exception: in case 3 both ex-ante and ex-post data were collected about the appraisal of change by the end users. Remarkably, apart from the Balanced Scorecard no performance measurement framework that is presented in the literature was applied in practice in its original form. Probably these frameworks are not well-known by practitioners or perceived as too complex and not practically applicable.

5.4 Statoil study of international FM benchmarking

Even before the European standards were developed, there were a number of cases of international benchmarking of FM – particular from multinational companies aiming at creating overview, standardising and streamlining the FM provision in the different national companies in the corporation. Most of such cases have been presented at business conferences. There are limited examples of research-based cases. An interesting example concerns the Norwegian based international oil company Statoil.

In 1999, Statoil conducted a first international benchmarking project together with seven large corporations from Denmark, Finland and Sweden. Together with a consulting company they conducted a combined performance and process benchmarking process by visiting all participating corporations and collecting both quantitative and qualitative data (Jensen et al., 2008). The study showed that Statoil had a cost level of their FM that was similar to or a little below the most relevant comparison partners. A number of improvement areas were recommended to further develop FM in Statoil. One recommendation was to introduce internal rent of spaces to make the cost of use of space visible to the user organisation, which was soon implemented. Another recommendation was reduction of the space per workplace by using modern office solutions. Following this, Statoil introduced a space strategy in 2001 with the objective to reduce the average office space from 39 m² in 2001 to 25 m² per office user in 2010. This was to be achieved by rebuilding 500 cell offices per year to open office solutions.

After a few years, this strategy of Statoil appeared to be unrealistic. From 2001 to 2005, the use of space per office user was only reduced from 39 m² to 34.5 m². All employees still had dedicated workplaces. The office use and the office solutions were still mainly traditional with approx. 78% in cell offices and 22% placed in open office environments. The estimates that were the basis of the objective of 25 m² per office user set up in 2001, were theoretical and not adequately based on analyses of existing office solutions. Therefore, Statoil initiated a second benchmarking project in 2005 with a particular focus on space utilisation and with involvement of the same consulting company. The project should contribute to a review of the space strategy from 2001 based on specific space analyses. They chose four benchmarking partners, three from Norway and one from Denmark. After a meeting with each party, the consulting company collected data for selected buildings from each participants and made detailed analysis of space utilisation of the floor plans.

This second benchmarking study showed an average total space of 28.0 m² per workplace, with Statoil being the highest with 33.5 m², whereas the lowest was extreme with just 11.8 m², and the second lowest 24.3 m². The primary space varied less, from 9.7 to 13.2, with an average of 11.7 m². The secondary space was in average 9.5 m². The shared space was in average 6.8 m², but varied from 7% to 30% of the total space. Besides the highest total space, Statoil also had the highest primary space and the highest percentage of shared space. Furthermore, the benchmarking

showed great differences among each building and wings with each participant. In continuation of this benchmarking project, Statoil formulated a new space strategy for office buildings. They now aimed for establishing approx. 5% over capacity in office spaces to avoid being forced to implement comprehensive moving processes, when changing needs occur for an organisational unit. Based on the experiences from a number of rebuilding projects Statoil now plan with a differentiation in the numbers of workplaces of different types, when rebuilding existing buildings compared to new building. Besides the space strategy and the plan of action for office buildings, Statoil also started to formulate an overall real estate strategy, which includes strategies for the development of each building and location.

The case study shows that Statoil developed from having a strong focus on space reduction towards focusing on space as a resource that should be easy adaptable to changes in the business organisation and fit with the organisational culture. This took place in a situation when Statoil was in a rapid expansion. We do not have information about how this has developed during the financial crisis and the reduction in oil prices.

6 Towards a NEW benchmarking standard

So far, in spite of the EuroFM standards on benchmarking, no consensus comes to the fore regarding what performance areas and KPIs should be included in benchmarking practices. Whereas theory and practice show a number of similarities, a huge variety of performance areas are applied in practice, with different names, different KPIs, and different priorities. Partly this makes sense, because the selection may depend of the context (e.g. a healthy economy or an economic crisis), type of organisation (public or private, age, vision and mission, core values, market share etc.) and the current or expected mismatch between demand and supply. However, to be able to benchmark, performance measurement systems should be better comparable. In our book on FM and CREM as Value Drivers (Jensen and Van der Voordt, 2017) we developed a list of 12 value parameters, that is based on a comparison of a number of different lists in the literature, see Table 8.

Table 8: Twelve value parameters according to Jensen and Van der Voordt (2017).

| Group | Parameter |
|---------------------|---------------------------------|
| People | Satisfaction |
| | Image |
| | Culture |
| | Health and Safety |
| Process and Product | Productivity |
| | Adaptability |
| | Innovation and Creativity |
| | Risk |
| Economy | Cost |
| | Value of Assets |
| Societal | Sustainability |
| | Corporate Social Responsibility |

These values have been elaborated by experts from six different European countries, who were asked to present a state of the art of current knowledge and available evidence of the impact of buildings, facilities and services on these values. Furthermore, the experts have been asked to explore how these values could be managed and measured. Appendix 3 presents a number of interventions, assessment methods and KPIs for each value (Hoendervanger et al., 2017).

Table 9 presents examples of output and outcome indicators in connection to FM/CREM performance and organisational performance. KPIs may regard quantitative numbers that can be compared with objective standards, e.g. the actual m² per person in comparison to a corporate standard, or CO₂ emission in comparison to legislation or scores in certification schemes like BREEAM, LEED or DGNB. However, many intangible and “soft” factors can only be measured in a qualitative and sometimes also more subjective way, for instance by measuring the *perceived* support of productivity or the *perceived* support of corporate culture by surveys. To what level the output and outcome has been improved can be measured by calculating the difference between FM/CREM performance and organisational performance before and after the intervention(s).

Table 9: Examples of indicators for output and outcome benefits and sacrifices to measure the impact of FM/CREM interventions such as workplace change (based on Hoendervanger et al., 2017)

| | FM/CREM output indicators i.e. a positive or negative impact of (workplace) change to | Organisational outcome indicators i.e. a positive or negative impact of (workplace) change to: |
|------------|--|--|
| Benefits | <ul style="list-style-type: none"> • Quality of the work environment • Access to public transport • Use of space (high occupancy level, low vacancy) and other resources • Healthy and safe indoor environment • Adaptability • Balance between openness and enclosure • Walking distances • Personal control of the indoor climate • Diversity of available workspaces and meeting places • Quality of visual clues | <ul style="list-style-type: none"> • Job satisfaction and staff turnover • Market share • Corporate identity, brand and culture • Absence due to sick leave • Number of accidents • Individual and team productivity, quantitative and qualitative • Uptime of critical activities • Consumption of primary energy and water, CO₂ emissions, material use, and waste, and high level of recycling • Attraction and retaining of talented staff • Community satisfaction |
| Sacrifices | <ul style="list-style-type: none"> • Downtime of critical activities • Total expenses of risk and damages • Investment cost and life cycle cost per m², per workstation or per fte (subdivided in total FM, space and infrastructure, people and organisation, space and work places | <ul style="list-style-type: none"> • Reduced market share • Reduced profitability • Less involvement and commitment of shareholders and stakeholders. |

7 Reflections and conclusions

The comparisons between theory and practice in this paper have shown that there is still a long way to go before a widely accepted standardised framework for benchmarking will be available. Cost and efficiency are still the dominating indicators for benchmarking and methods for measuring and benchmarking effectiveness is much underdeveloped. The benchmarking outputs based on CEN (2012) can be used as a starting point, but they should be extended with additional topics –

including some of those included in Table 8 such as adaptability, health and safety, image, and Corporate Social Responsibility indicators. This implicates that a business case should go beyond just using spreadsheets with cost and m² data, but also should include a discussion of values that cannot be easily expressed in metrics.

Whereas performance benchmarking is an essential method to monitor performance and compare ones organisation with other organisations, and can indicate which areas need improvement, performance benchmarking cannot in itself help to find specific improvement measures. An option can be to conduct performance benchmarking on a regular basis and based on that by intervals select an area for improvement and conduct process benchmarking within that area. By detailed comparison of specific processes real learning can be achieved and ideas for improvement identified (Jensen, 2008).

The following steps could be helpful to define, which KPIs should be included in benchmarking on a regular basis, and which ones could be selected in addition to this:

1. Identify the main drivers to change, due to strengths, weaknesses, opportunities and risks, both regarding the organisation, its buildings, facilities and services, and relations between “demand and supply”.
2. Focus on the main issues
3. Add performance indicators that can be measured easily
4. If problems come to the fore: measure selected areas that should be measured in-depth

Relevant questions are for instance: Which building, facilities and service characteristics align best to the mission and vision of the organisation and organisational objectives? Which characteristics show a misfit and do not support the work processes optimally? Which KPIs could be applied to measure these connections? Which indicators are key?

An interesting next step for organisations such as EuroFM to further improve the EN 15221-7 standard on benchmarking could be to monitor and analyse current benchmarking practices, search for similarities and dissimilarities, explore what makes sense and what does not, and use the 12 value parameters as a reference frame. Another next step could be – as proposed at a recent research workshop (Appel-Meulenbroek, 2017) - to further explore how business cases are made in practice, who is involved in the decision-making process, what values are included and why, which performance indicators are most efficient and most effective, and which research methods would be most appropriate.

REFERENCES

- Alexander, K. (Ed.) (2005), *Usability of Workplaces – Report on Case Studies*. CIB – International Council for Research and Innovation in Building and Construction. CIB-report 310.
- Appel-Meulenbroek, R. (2017) Minutes of a brainstorm session on five important issues in workplace research. Workplace research track. 24th Annual Conference of the European Real Estate Society, 29 June - 1 July 2017, Delft, The Netherlands
- Bradley, S. (2002), “What’s working? Briefing and evaluating workplace performance improvement”, *Journal of Corporate Real Estate*, 4(2), 150-159.
- Brunia, S. (2016) *CfPB Indicator 2015*. Internal report. Delft: Centr for Peopl and Buidlings.

- CEN (2006), *Facility Management. Part 1: Terms and definitions*. European Standard EN 15221-1. European Committee for Standardization.
- CEN (2012), *Facility Management. Part 7: Guidelines for Performance Benchmarking*. European Standard EN 15221-7. European Committee for Standardization.
- Dewulf, G., Krumm, P. and De Jonge, H. de (2000), *Successful corporate real estate strategies*. Nieuwegein: Arko Uitgeverij.
- EuroFM (2001), *Facilities Management Benchmarking in Europe – A comparative Study of FM Benchmarking Systems in Six European Countries*. EuroFM Report. The Netherlands.
- Gibler, K.M. and Lindholm, A-L. (2012), A test of corporate real estate strategies and operating decisions in support of core business strategies. *Journal of Property Research* 29(1), 25-48.
- Hoendervanger, J.G., Bergsma, F., Van der Voordt, T. and Jensen, P.A. (2017), “Tools to manage and measure adding value by FM and CREM”, in Jensen, P.A. and van der Voordt, T. (Eds), *Facilities Management and Corporate Real Estate Management as Value Drivers: How to Manage and Measure Adding Value*, Chapter 17, Routledge, Oxfordshire, pp. 299-322.
- ISO (2016), *Facilities management — Vocabulary*. Draft International Standard ISO 41011:2016(E). International Standard Organization.
- Jensen, P.A. (2008), *Facilities Management for Students and Practitioners*, Centre for Facilities Management – Realdania Research, DTU Management Engineering, Lyngby.
- Jensen, P.A., Nielsen, K. and Balslev Nielsen, S. (2008), *Facilities Management Best Practice in the Nordic Countries – 36 cases*, Centre for Facilities Management - Realdania Research, DTU Management Engineering, Kgs. Lyngby.
- Jensen, P.A., Van der Voordt, T. and Coenen, C. (Eds) (2012), *The Added Value of Facilities Management: Concepts, Findings and Perspectives*, Polyteknisk Forlag, Lyngby.
- Jensen, P.A. and Van der Voordt, T. (2015), “How can FM create value to organisations? – A critical review of papers from EuroFM research symposia 2013-2015”, Research Report, A EuroFM Publication, April 2015.
- Jensen, P.A. and Van der Voordt, T. (2017), *Facilities Management and Corporate Real Estate Management as Value Drivers: How to Manage and Measure Adding Value*, Routledge, Abingdon-on-Thames.
- Joroff, M., Louargand, M., Lambert, S. and Becker, F. (1993), *Strategic Management of the Fifth Resource: Corporate Real Estate*. Norcross, GA: Industrial Development Research Foundation. Report no. 49.
- Kaplan, R. S. and Norton, D. P. (1992), “The balanced scorecard – measures that drive performance”, *Harvard Business Review*, 70(1), 71-79
- Kaplan, R. S. and Norton, D. P. (2004), *Strategy maps: converting assets into tangible outcomes*, Harvard Business School Publishing. Massachusetts, USA.
- Keegan, D. P., Eiler, R. G. and Jones, C. P. (1989), “Are your performance measures obsolete?” *Management Accounting*, 70(12), 45-50.
- Kimmel, P. (no year), *Benchmarking for Facility professionals*. FM Benchmarking / IFMA Foundation.
- Lavy, S., Garcia, J.A. and Dixit, M. K. (2010) Establishment of KPIs for facility performance measurement: review of literature. *Facilities* 28(9/10), 440-464
- Nase, I., Gupta, K. and Arkesteijn, M. (2017). What is served for breakfast? Internal report. Delft: TU Delft.
- Neely, A., Adams, C. and Crowe, P. (2001), “The Performance Prism in Practice, Measuring Excellence”, *The Journal of business performance management*, 5, 6-12.

- Netherlands Facility Costs Index Coöperatie u.a.(2017) *Jaarbericht NFC Index® Kantoren 2016*. Naarden.
- Porter, M.E. (1985), *Competitive advantages: Creating and sustaining competitive performance*. London: Free Press.
- Riratanaphong, C. (2014), “Performance management of workplace change in two different cultural contexts”, PhD thesis, Delft University of Technology, Delft.
- Riratanaphong, C. and Van der Voordt, D.J.M. (2015), “Measuring the added value of workplace change. Performance measurement in theory and practice”, *Facilities*, Vol. 33 Nos 11/12, pp. 773-792.
- Sinclair, D. and Zairi, M. (1995), “Effective process management through performance management”, *Business Process Re-engineering & Management Journal*, 1(1), 75-88.
- Sink, D. S. and Tuttle, T. C. (1989), *Planning and measurement of in your organisation of the future*, Industrial Engineering and Management Press, Norcross, USA.
- Tangen, S. (2005), “Demystifying Performance and Productivity”. *International Journal of Productivity and Performance Management*, 54 (1), 34-46.
- Van der Voordt, D.J.M. (2003), *Costs and Benefits of Innovative Workplace Design*, Center for People and Buildings, Delft.
- Van der Voordt, T. and Jensen, P.A. (2014), “Adding value by FM: exploration of management practice in The Netherlands and Denmark”, in: Alexander, K. (Ed.), *Research Papers Advancing knowledge in Facilities Management*. Proceedings of the European Facility Management Conference 2014, Berlin, 4-6 June 2014.
- Van der Voordt, T., Jensen, P.A., Hoendervanger, J.G. and Bergsma, F.K. (2016), “Value adding management of buildings and facility services in four steps”, *Corporate Real Estate Journal*, Vol. 6 No. 1, pp. 42-56.
- Van der Voordt, T. (2016), “Adding value by health care real estate: parameters, priorities, and interventions”, *Journal of Corporate Real Estate*, Vol. 18 No. 2, pp. 145-159, Special Issue.
- Van 't Spijker, A, and Van der Meer, J. (2010) “Het nieuwe werken werkt echt! Kwalitatieve en kwantitatieve effecten”. *Facility Management Magazine* 23(182), 18-21.

Appendix 1: CRE performance measures according to Bradley (2002), left, and measures found in three case studies, right (Riratanaphong and Van der Voordt, 2015)

| | Bradley (2002) | Case 1 | Case 2 | Case 3 |
|---|---|---|---|--|
| 1 Stakeholder perception | | | | |
| Employee and customer satisfaction with the work environment, facilities and services | Employee satisfaction with: Quality of indoor environment (lightning, air conditioning, temperature, noise level); provision of safe environment; location (access to employees, local amenities); ratio of office space to common areas; provision of amenities; amount of workplace reforms and space modifications; professional skills; information sharing. Survey ratings of the facilities, building, property management and CRE services; number of complaints; call frequency; cost per m2 help desk; location (proximity to transportation, access to customers, distance to other sites and businesses) | Employee satisfaction with: lighting, temperature, noise-, odour- or dust disturbance, ICT related support services, management of facilities, safe environment, self-protection equipment in case of accident. Satisfaction of the building users. | Employee satisfaction with: diversity of the spaces, opportunities to work outside the office, atmosphere, interaction and knowledge exchange, IT, IT related support services, and management of facilities. Rank in customer survey; number of complaints | Employee satisfaction with: air quality (dust, odours, fresh air), temperature, adequate space, lighting, noise, appearance of the workplace, IT related support services, and management of facilities. Customer satisfaction survey |
| 2. Financial health | | | | |
| Value of property, plant and equipment | Business return on real estate assets; real estate return on investment and on equity; sales or revenue per square metre; square metres per unit of revenue; return on property management | Income from commercially rented area Return on asset | NA | NA |
| 3. Organisational development | | | | |
| Quality of facilities | Physical condition of facilities; suitability of premises and functional environment; number of building quality audits | Work done according to the development of building management and ICT standard | Risk management and business control (strategic, operational, compliance and financial risks) | Risk Inventory and Evaluation (RI&E) including the physical condition of facilities |
| Accommodation usage | M2 per employee; effective utilisation of space e.g. amount of teamwork space, vacancy rates, time wasted with interruptions due to open space layout | NA | NA | m2 per desk (according to labour law) |
| CRE unit quality | Time used in project versus time budgeted; money spent on project versus money budgeted; amount of advice given to other business units | Delivering rentable area to other government agencies; percentage of allocating commercial area | % reduction in process cycle time; number of engineering change; capacity utilization; order response time; process capability | Design process descriptions and optimizing business processes |

NA = not applied i.e. not measured or no data available

Appendix 1: CRE performance measures according to Bradley (2002) (left) and measures found in three case studies (right) (Riratanaphong and Van der Voordt, 2015) – continued

| | Bradley (2002) | Case 1 | Case 2 | Case 2 |
|--|--|--|--|---|
| 4. Productivity | | | | |
| Employee productivity | Productivity (% of perceived productivity support from working environment) Absentee rates by buildings | Health & wellbeing in the workplace; productivity survey | Health & wellbeing in the workplace through workplace innovation (WPI); productivity survey | Health & wellbeing through workplace desi; productivity survey (WODI) |
| Strategic Involvement | CRE involved in corporate strategic planning; CRE integrated with HR strategies; CRE actively involved in firm-wide initiatives such as special asset use, consolidations, shared services | Master plan of the IT system; management of the information system; IT solution in HRM | Implementation of WPI; smart IT solutions for WPI | Implementation of flex workplaces |
| 5. Environmental responsibility | | | | |
| Resource use | Energy consumption, Number of energy audits | Introduction of green building, construction materials and equipment that meet local content | Green products; energy efficiency; recycling of company's products; amount of recycled materials in company's products | Sustainable approach to the new building; EU Energy label |
| Waste | Contaminated sites management,; amount of garbage | NA | NA | NA |
| 6. Cost efficiency | | | | |
| Occupancy costs | Total occupancy cost per employee; occupancy cost as a % of total operating expense; occupancy cost as a % of operating revenue | Taxes (property and land) | Office rent /sq. m./ month | Depreciation expense |
| Operating costs (building and FM) | Total operating expenditures versus budget; ditto for various components | Operating costs; facility costs (buildings & equipment); overhead costs; fees and services | Utility (electricity & water) cost/unit; parking cost/month; overhead cost | Salary costs; social charges; personnel costs of third party |

Appendix 2: Performance criteria according to Sunk and Tuttle (1989), left, and performance measures found in three case studies, right (Riratanaphong and Van der Voordt, 2015)

| Performance criteria (Sink and Tuttle, 1989) | Performance measures from case studies | | |
|--|---|--|--|
| | Case 1 | Case 2 | Case 3 |
| Effectiveness Degree to which an organization accomplishes what it set out to accomplish | Work done according to assigned plan from government; | Market introduction in time; Market introduction realized sales | Data for benchmarking the company's output |
| Efficiency Ratio of resources expected to be consumed to resources actually consumed | Investment plan | Operational cash flow | Budget comparison |
| Quality The assurance of quality at the organisational system (i.e. input, process, output) | Quality assurance; Internal audit as a part of organisational system | Quality improvement ; team participation | Quality management, i.e. the evaluation of physical condition of facilities as a part of organisation's performance measurement system |
| Productivity Relationships between outputs and resources consumed | Work done according to assigned plan from the government; Percent of work done; Human Resource Management: IT solution in HRM | Output: Sales growth; Input: Number of positions filled | Product based on the number of hours work |
| Quality of work life Feelings of workforces on key factors in an organisation such as safety, compensation, pay, etc. | Human Resource Management: Employee satisfaction with regard to safety, health and environment | Employee attitude survey: perceptions and attitudes related to employee satisfaction) | Employee satisfaction with regard to: air, temperature, adequate space, lighting, noise level, appearance of the workplace |
| Innovation A key factor in sustaining and improving performance | Master plan of the IT system; Management of the information system; IT solution in HRM | Implementation of the workplace innovation concept ; Smart IT solutions for workplace innovation | Implementation of the flex workplace |
| Profitability Relationships between revenue and cost | Earnings before interest, taxes, depreciation and amortization (EBITDA) | Economic profit realized; Income from operations; Working capital; Inventory turns | Available cash to be deposited at the current value of the assets |

Appendix 3: Examples of interventions, assessment methods and KPIs
(Van der Voordt et al., 2016)

| Value | Interventions | Tools to measure impact | KPIs (Top 3) |
|---------------------------------|--|---|--|
| Satisfaction | More suitable spatial layout. More collaborative spaces. Better indoor climate. | Employee surveys. Interviews. Walk-throughs. | Employee satisfaction with: - Workplaces - Collaborative space - Indoor environment |
| Image | Move to a new location. High quality surroundings. Reorganisation of spatial layout. | Stakeholder surveys. Group discussions. Analysis of social media | Perceptions of Corporate identity, Corporate value, Corporate brand |
| Culture | More open settings to support collaboration. Shared desks/places. New behavioural rules. | Employee surveys. Observations. Interviews. Workshops. | Perceptions of - Corporate culture - Match between culture and work environment |
| Health & Safety | Higher level of personal control. Ergonomic designed furniture. Better indoor air quality | Capture and react on complaints. Workplace H&S assessment. | Sick leave. Number of accidents. % of satisfied employees. |
| Productivity | Higher level of transparency to support collaboration. Facilities for concentrated work. Ergonomic furniture. | Observations. Measuring time spent or saved. Employee surveys. | Output per employee. Perceived support of: - Individual productivity - Team productivity |
| Adaptability | Surplus of spaces, load-bearing capacity, installation capacity, and facilities. Removable and relocatable units and building components. | Building performance assessment, i.e. using Flex 2.0 or Flex 2.0 Light. Observation of adaptations of the building-in-use. | Weighted assessment values, i.e. scores on scales of Flex 2.0 or Flex 2.0 Light. |
| Innovation and Creativity | Better visibility and overhearing. Different types of meeting spaces and informal areas. Virtual knowledge sharing ICT. | Spatial network analysis. Social network analysis. Logbooks on knowledge sharing activities. | Level of enclosure/openness. Average walking distance. Diversity of workspaces and meeting places. |
| Risk | Emergency and recovery plans. Back-up supply systems. Insurances. | Measuring time of business interruptions. Measuring risk expenses | Uptime of critical activities. Total risk expenses. Total insurance expenses. |
| Cost | Cost saving by - Establishing FM department - Process optimization - Outsourcing | Accounting with an appropriate cost structure. Measuring space, number of workstations and f.t.e. | Cost/m ² , workstation or f.t.e of Total FM, Space, Workplace |
| Value of Assets | Disposal of CRE. Sale and lease back. Improve owned CRE by adaptive reuse. | Estimate annual potential gross income and annual operational expenses. Market valuation. Estimate cost of new development. | Capitalization. Market value. Cost of new development. |
| Sustainability | Sustainability framework. Reduction of energy consumption. Reduction of travel and transport activities. | Critical success factors from corporate strategy Survey with multi-criteria scoring methodology Continuous review process. | Consumption of primary energy and water. CO ₂ emissions. Access to transport. |
| Corporate Social Responsibility | Employing challenged workers. Promoting public transport. Circular purchasing model. | Depends on corporate CSR policy and target. | People: diversity of staff Planet: Utilization of space Profit: Total FM/CREM cost |

About the authors

Theo van der Voordt is an Emeritus Associate Professor in Corporate and Public Real Estate Architecture and the Built Environment, Delft University of Technology. He is also a Senior Researcher at the Center for People and Buildings in Delft, The Netherlands. His research focuses on accommodation strategies that optimally match demand and supply, workplace management, performance measurement, health-care real estate strategies, adaptive reuse as a means to cope with vacancy and adding value by FM and CREM. Theo J.M. van der Voordt is the corresponding author and can be contacted at: D.J.M.vanderVoordt@tudelft.nl

Per Anker Jensen is a Professor in Facilities Management and Head of the Externally Funded Center for Facilities Management – Realdania Research, Technical University of Denmark. Before he started an academic career, he worked for 20 years in practice as a Consultant, Project Manager and Facilities Manager. He was a Member of the Board of EuroFM and Chairman of EuroFM's Research Network Group in 2007 and 2008.