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

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

Theo J.M. van der Voordt. Delft University of Technology, Faculty of Architecture and the Built Environment, D.J.M.vanderVoordt@tudelft.nl

Per Anker Jensen, Centre for Facilities Management - Realdania Research, DTU Management Engineering, pank@dtu.dk

Abstract

Purpose: This paper presents a process model of value adding corporate real estate and facilities management and indicators that 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 current practice and data from different work environments. The paper 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.

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 including 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

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). According to EN 15221-1, facilities management (FM) is 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, 2017a). 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; ISO, 2017b).

In both definitions of CREM and FM, supporting (business) processes and adding value to the organisation are key concepts. This paper presents a newly developed process model of value adding corporate real estate and facilities management and discusses which indicators can be used to measure and benchmark workplace performance and the added value of workplace interventions for an organisation.

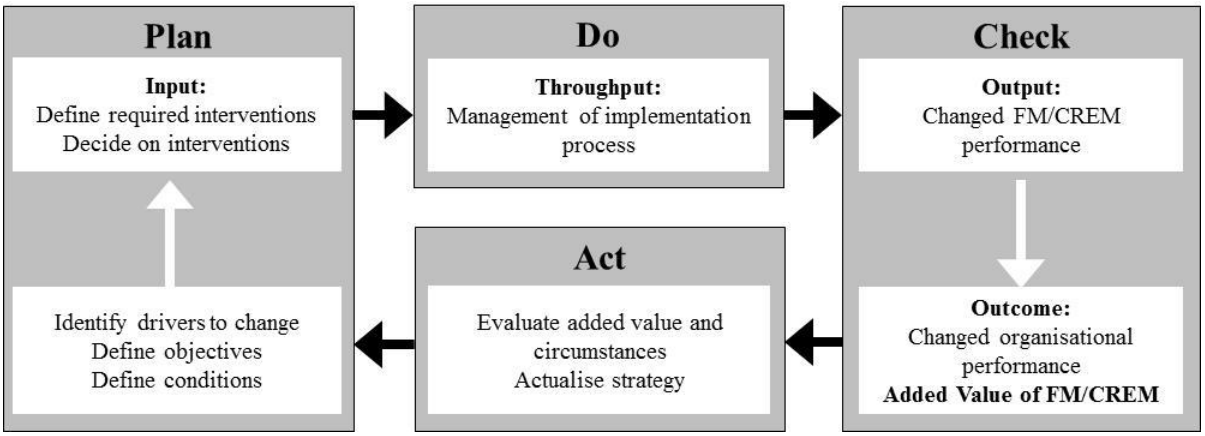
The paper builds on two books on adding value through buildings, facilities and services, both edited and co-authored by the authors of this paper (Jensen, Van der Voordt and Coenen, 2012; Jensen and Van der Voordt, 2017). The books were based on literature reviews, interviews with practitioners, cross-border studies of performance measurement and benchmarking, and in-depth analyses of twelve value parameters by experts from different countries. For the purpose of this paper, theory and empirical examples of benchmarking have been added.

. The paper first briefly presents the value adding management model (section 2). Then it discusses performance measurement and benchmarking theory (section 3 and 4) and current practice and empiric data from different work environments (section 5). Finally, it discusses the gaps between theory and practice and reflects on further improvements of both theory and practice (section 6).

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 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 accommodation, facilities and services, and 2) to define which interventions may result in improved performance, and whether the benefits outweigh the costs and sacrifices.

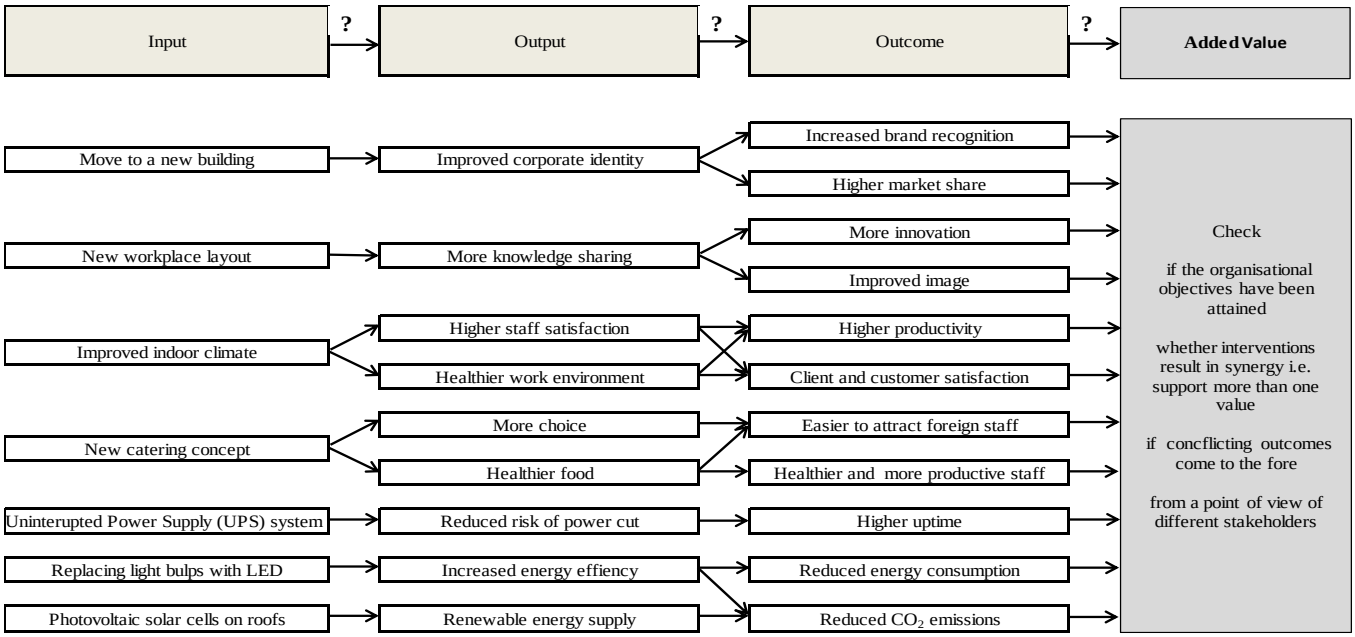
The *Do-phase* encompasses the implementation of the proposed interventions and management of the change process.

In the *Check-phase* the costs and benefits of the intervention(s) and its impact on the performance of the organisation and its buildings, facilities and services 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). The *output* of the change process regards the change in CREM/FM performance (for instance less m^2 per person, reduced CO_2 emission, or lower facility costs), whereas the *outcome* refers to whether the changed FM/CREM performance fits with the organisational strategy, mission, vison 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. On the other hand, 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 Porters value chain (Porter, 1985) between support activities and primary activities, which is also reflected in the management model in EN 15221-1 (CEN, 2006). It is important to be aware of this distinction in all phases of the VAM model.

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 m^2 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) and Van der Voordt et al. (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. Finally, a new benchmark framework is proposed 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. Schuur (2015) refers to the old adage "what gets measured, gets done" and states that measurements are important because they convey the following types of information about the performance of an organization:

- Focus attention on the factors that influence the achievement of the organization's goals;
- Show how effectively the organization uses its resources;
- Assist in setting goals and monitoring trends;

- Provide the inputs for analysing the sources of errors or underperformance
- Identify opportunities for ongoing improvement;
- Identify if an organization is "winning" or "losing";
- When winning, give the organization a sense of accomplishment; and
- Monitor progress

Nowadays many conceptual frameworks, measurement systems and performance indicators are available (Anderson and McAdam, 2004; Riratanaphong, 2014; Støre-Valen and Lohne, 2016). 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. Loosemore and Hsin (2001) made a distinction in functional, physical and financial performance and show that used KPIs are different is different sectors such as the health care sector, education and postdelivery.

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).

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.

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. Jordan (2011) focuses on quality, cost and schedule indicators.

To summarise, 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). According to Adewunmi and Ajayi

(2016), benchmarking may help managers to improve performance, service quality and their processes, to make strategic plans to be the best in the industry, to obtain explanations for improvements that are made now and in the near future, and to make well-argued business cases. In order for benchmarking to be successful, it is important to have a full commitment to continuous improvement, an ability to learn from others, and a commitment to implement improvement (Magd and Curry, 2003).

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/m^2 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 of this, 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 benchmark indicators, divided in 6 areas, see Table 1.

Table 1: Benchmark indicators (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)

5 Performance measurement and benchmarking in practice

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 2. 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 2: Prioritised values from ten interviews with practitioners

	1st	**2nd**	**3rd**	**4th**	**5th**
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 3.

Table 3: Comparison of two CoreNet Global member surveys on prioritised values

	2016 Survey			2010 Survey[3]			
CREM strategy	GM Value[1]	Rank	N[2]	GM Value	Rank	N	Rank change
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 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 The trade-off between benefits and costs of new workplace practices

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. This is in line with the definition of management as the transformation of resources into utility, thus focusing on the benefits (Maucher et al., 2014). However, according to Jensen et al. (2012), adding value regards the trade-off between benefits and costs. Table 4 gives an overview of possible costs and benefits of activity-based workplaces; monetary and non-monetary (Van der Voordt, 2003).

Table 4: Possible benefits and costs of adopting activity-based workplaces

Possible benefits / Main drivers to change	Possible costs and risks
• 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	• 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 of workplaces, in practice most attention is payed to cost data and m^2 data. For this purpose, the Netherlands Facility Costs Index can be used as a means to benchmark, In 2016 an average of € 461 per m^2 rentable floor space was found, excluding VAT (NFC, 2016). The median workspace was 19.8 m^2 rentable floor space, the median costs per workplace € 9,128 per year. No distinction is made between traditional cellular offices and modern, activity-based work settings. Data by Van‘t Spijker and Van der Meer (2010) showed higher accommodation costs per m^2 gross floor space in Dutch offices in commercial offices with a flex-ratio of 0.5 á 0.7 than in traditional offices with personal desks (about € 425 versus € 325). Calculated per person the costs are much lower in flex-offices (€ 4.000 - € 4.900) than in traditional offices (€ 6.000- € 7.800). These figures also show that it is important to use the same units instead of a variety of costs per m^2 net or gross floor space, workplace, person or full time equivalent (f.t.e.).

Regarding employee satisfaction and (perceived) productivity support, the Satisfaction Index of the Center for People and Buildings can be used as a benchmark indicator. 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. Table 5 shows some data from over 100 cases.

Table 5: Dutch data on average percentages of satisfied and dissatisfied employees in traditional and activity-based work settings

	Traditional offices with personal desks	**Acivity-based work settings**	**Traditional offices with personal desks**	**Acivity-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**
Opprotunities for remote working	47	54	21	18
Perceived support of productivity	**Suportive**	**Supportive**	**Not supportive**	**Not supportive**
Own productivity	**46**	**36**	**19**	**30**
Team productivity	43	36	17	26

Internationally various benchmark data are available as well, such as the Leesman Index (employee satisfaction) and the Global Occupier Metrics of Cushman & Wakefield (costs, m^2).

5.3 Benchmarking of workplace performance in 3 cases

In his PhD study, Riratanaphong (2014) explored which workplace performance areas are being used in 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). Table 6 and 7 show some examples of the variety in performance indicators.

Table 6: Examples of CRE performance measures according to Bradley (2002), left, and measures found in three case studies, right, adapted from Riratanaphong and Van der Voordt (20015)

	Bradley (2002)	**Case 1**	**Case 2**	**Case 3**
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
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
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

Table 7: Examples of performance criteria according to Sunk and Tuttle (1989), left, and performance measures found in three case studies, right (adapted from 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; Realized sales	Data for benchmarking the company's output
Efficiency Ratio of resources expected to be consumed and 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

Most performance criteria found in the case studies are measured by cost data such as operational cash flow (efficiency), quality management indictors (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 Sink and Tuttle (1989) showed up to be included in all three cases, be it with different interpretations and in different ways. 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. 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 m^2 in 2001 to 25 m^2 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 39.0 m^2 to 34.5 m^2. 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 m^2 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 m^2 per workplace, with Statoil being the highest with 33.5 m^2, whereas the lowest was extreme with just 11.8 m^2, and the second lowest 24.3 m^2. 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 m^2, 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 between each of the building and wings and each of the 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.

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.

6 Gaps between theory and practice and suggestions for the future

The comparisons between theory and practice show that in spite of the EuroFM standards on benchmarking, still no consensus seems to exist 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 prioritised values and selected KPIs depend on 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, which requires a more standardised framework and common performance areas and KPIs. The benchmark indicators based on CEN (2012) can be used as a starting point, but should be extended with additional topics such as productivity benefits, adaptability, health and safety, image, and Corporate Social Responsibility indicators. A standardised benchmark framework with a wider scope – including effectiveness - can be used as input to a more holistic approach and integrated business cases that go beyond spreadsheets with a focus on efficiency, cost and m^2 data (see also Bititci et al., 2012; Oseland and Burton, 2012). It may help to also discuss values that cannot be easily expressed in metrics.

6.1 Towards a new benchmarking framework

In our book on FM and CREM as Value Drivers (Jensen and Van der Voordt, 2017) a list of 12 value parameters is presented, 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. Table 9 presents a number of interventions, assessment methods and KPIs for each value (Hoendervanger et al., 2017).

Table 9: 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. $C0_2$ 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

Table 10 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 m^2 per person in comparison to a corporate standard, or CO_2 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 10: Examples of output and outcome indicators to measure the impact of FM/CREM interventions such as workplace change (based on Hoendervanger et al. 2017)

	FM/CREM performance indicators i.e. a positive or negative impact of (workplace) change on:	Organisational performance indicators i.e. a positive or negative impact of (workplace) change on:
Benefits	• 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	• 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, $C0_2$ emissions, material use, and waste, and high level of recycling • Attraction and retaining of talented staff • Community satisfaction

Sacrifices	• Downtime of critical activities • Total expenses of risk and damages • Investment cost and life cycle cost per m^2, per workstation or per f.t.e. (subdivided in total FM, space and infrastructure, people and organisation, space and work places	• Reduced market share • Reduced profitability • Less involvement and commitment of shareholders and stakeholders.

6.2 Performance management

Whereas performance benchmarking is an essential method to monitor performance and compare ones' own performance with other organisations, and can indicate which areas need improvement, performance benchmarking cannot in itself help to find specific improvement measures. In the last decades, the focus in the organisational performance field has shifted from performance measurement (i.e. what to measure, how to measure and how to report the results) to performance management (i.e. how to use the measures to manage performance of the organisations) (Bititci et al., 2016).

A recommended management procedure is 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. Process benchmarking relates to comparisons of one's own work processes and procedures against the processes in other organisations with an aim to reveal differences of importance for the performance. While performance benchmarking in most cases involves quantitative key performance indicators, process benchmarking typically include both quantitative and qualitative comparisons. By detailed comparison of specific processes, real learning can be achieved and ideas for improvement identified (Jensen, 2008).

6.3 Follow-up actions and research

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. In order to stimulate its application in practice, dissemination of information and training would be welcome as well. This also holds true for the application of other systems.

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. Finally, further research is needed to develop academically sound and practically applicable methods for measuring and benchmarking effectiveness.

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