OPTIMISATION OF PERFORMANCE IN FACILITIES MANAGEMENT

Arnold W L Kwok
Clive M J Warren
School of Geography, Planning and Architecture
The University of Queensland
Brisbane QLD 4072 Australia

Abstract

Facilities management and corporate real estate provision are becoming increasingly important to business success. Its trend follows the changing orientations of the built environment which includes commercial, educational, industrial, recreational, residential, retail and transport infrastructures. It also directly contributes to the success of business with its focus on consistency, continuous improvement, and reliability through time, cost and quality control. Thus, the study of facilities management in each sector of the built environments is essential to optimise business performance.

This paper discusses stakeholder relations and facility performance. It considers complex facility conditions in relation to daily business operation and searches for a suitable built environment in order to demonstrate further performance measurement. In addition to the common benchmarking techniques or best practice in facilities management, the paper also introduces a best match approach for management teams to benchmark among stakeholders. Finally, it discuses the pros and cons between the best match and the best practice approaches in business performance optimisation.

Key Words

Facilities Management, Built Environments, Stakeholder Relations and Facility Performance, Facility Conditions and Building Types, Best Practice and Best Match Approaches

Introduction

Fierce competition, variable trading conditions, high energy costs and other economic elements have forced companies to look at all means of reducing costs and maintaining a market edge (Jones and Jowett, 1998: 6). In these circumstances, facilities management has become established in all five continents, though it has traditionally been seen as a poor relation of the property and construction professions (Grimshaw, 2002: 3). The discipline deals in property management, financial management, change management, human resources management, contract management as well as health and safety in buildings, engineering services, maintenance, domestic services and utilities supplies (Atkin and Brooks, 2000: 1, 4; FEFC, 1997: 3, 105). It also follows the changing orientations of the built environment and business. Its links to the scope and success criteria of business are focussed on consistency, continuous improvement and reliability.

The challenge for facilities managers is to develop key performance indicators (KPI)[1] that directly relate the output of the business to the input of facilities (McGregor and Then, 1999: 126). It relates to "the measurement of importance or measuring what is important" rather than "the importance of measurement" (Nutt and McLennan, 2000: 62, 63). Therefore, a balanced solution or sequence of steps for individual organisations and professionals to manage and handle their daily operation is essential. Hence, the tasks of this paper are to:

- understand the built environment and facilities management,
- discuss stakeholder relations and facility performance,
- consider complex facility conditions and search for a representative built environment to demonstrate these conditions,
- introduce a best match approach and describe pros and cons between the best match and the best practice approaches to facilities management.

Background

Regardless of property type – commercial, educational, industrial, recreational, residential, retail, rural or transport infrastructure – audits and benchmarking studies indicate that these buildings, in many cases, are poorly managed. Their engineering services, for example, may fail to provide the intended quality of service or comfort, a deficiency which in turn directly affects occupant businesses and stakeholder benefits in facility operations. This failure often lies in a lack of integrated knowledge of the built environment, stakeholder relations and facility performance. In order to provide successful facilities management in any class of building, it is necessary to primarily explore the position of the building in the context of business and its supporting resources as shown in Figure 1.

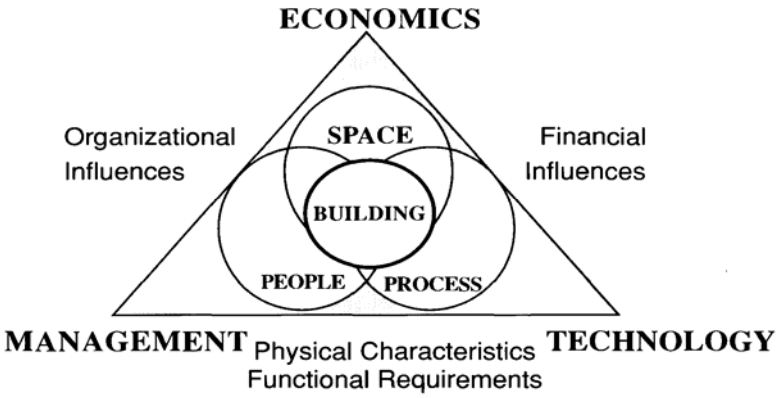

Figure 1: The Positioning of Building in Business

Source: McGregor and Then, 1999: 116

[1] A performance indicator is a quantitative measure of quality of the service, efficiency, productivity or cost effectiveness of an agency, program, or activity, that enables the comparison of performance to a standard target or norm for management purpose. It generally (but not always) contains two or more variables in practice (Robson, 1994: 2/1-2).

This figure illustrates not only the scope for appraisal in meeting the dynamics of the work environment in which businesses must operate (McGregor et al., 1999: 116), but also explains that the built environment is conducted within a framework of economics, management and technology. The aim is to optimise organisational and financial influences as well as physical characteristics and functional requirements. A successful building is thus an amalgam of people, process and space.

Understanding the role of buildings and how they can be deployed effectively, in the context of the operations of each individual business, is the essence of facilities management. Hence, facilities management will increasingly form a part of core business strategy and operations (Nutt et al., 2000: 247). The many and varied functions performed by the facilities manager are not new, but the trend towards an all-embracing professional who harnesses these complementary functions together into a cohesive approach to workplace management – the coordination of people, process and the workplace – is new (Payne, 2000: 61).

The function of facilities management is really a bridge between the changing workplaces and users (Alexander, 1996: 1). It focuses and develops appropriate action plans for property owners, managers and tenants of facilities to deal with current and future critical environmental issues in the workplace for customers. In general, facilities are the tangible fixed assets required for an enterprise to function; for instance, land or real estate, buildings or structures, process machinery, and support equipment, both stationary and mobile (Muther and Hales, 1979: 1/1). Therefore, facilities are defined as the infrastructure that supports people in the organisation in their endeavours to achieve business goals and they are the tools which people in the business have at their disposal to carry out their tasks (McGregor et al., 1999: 15).

Recently, the overall approach of facilities management has taken a different emphasis (Jones et al., 1998: 5). There is a shift from facilities management as a separate subject to a total approach including all the support services within an organisation or for more organisations working together (Everards and Favier, 2003: G5.1/2-6). This more comprehensive approach will call for much higher levels of competence and business skill than traditionally has been evident among many facilities management practitioners (McGregor et al., 1999: 236).

Facility performance appraisal is becoming a formal and regular operation (Amaratunga and Baldry, 2000: 294). Performance optimisation in facilities management should allow the indoor environment to support organisational business goals in the most effective, efficient and equitable way. The problem is how can facilities management professionals achieve these evolving goals. As facilities management becomes a statement of the actions (process) by which organisations deliver and sustain quality services in built environments (space) to meet strategic needs of stakeholders (people), it ensures buildings, system supports and core operations contribute to business achievements despite changing conditions. Knowing how people within an organisation make use of a building – how they can perform at their best – is the key to understanding facilities management (FEFC, 1997: 2, 104).

Although there is no universal agreement on the definition of performance (Amaratunga et al., 2002b: 207) and lack of universal approach to managing facilities, facility performance can be described as a continuous improvement process which is composed of four basic phases (Mueller, 2003: 20) in Figure 2:

- planning – developing strategies and establishing performance indicators,
- monitoring – gathering data,
- analysing – applying technology and expertise to data, and
- optimising – implementing solutions which fit the organisation's strategic business goals.

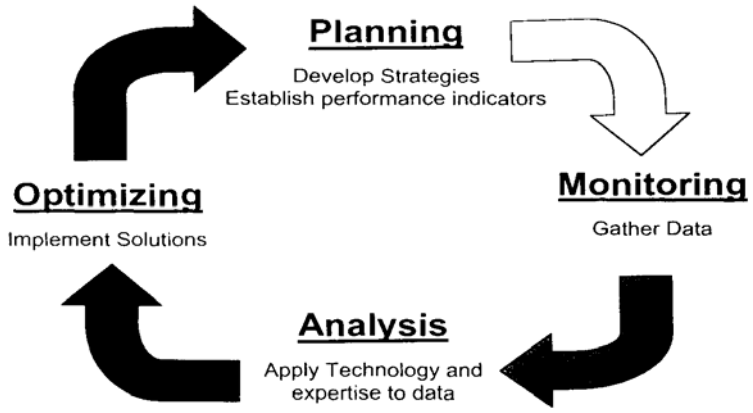

Figure 2: Facility Performance: A Continuous Improvement Process

Source: Adapted from Mueller, 2003: 21

Indeed, the first three phases are the process for the fourth one – optimising facility performance. Since the responsibilities of facilities managers extend beyond operating issues to the more fundamental goals of providing high performance and sustainable workplaces for business operations, the performance paradigm should accordingly be shifted from measuring facilities to measuring workplaces. There is a need to develop performance measures[2] to provide facilities managers with benchmarks of workplace quality in order to satisfy corporate needs (Warren, 2003: G5.3/2). Basically, an appropriate performance measurement system can achieve four potential benefits: satisfying customers, monitoring progress, benchmarking process and activities, and driving change (Amaratunga et al., 2002b: 207).

[2] Performance measurement considers feedback on activities that motivate behaviour leading to continuous improvement in customer satisfaction, flexibility, and productivity. It is not an employee evaluation (Timo, 1997: 42).

Therefore, new measurement paradigms are critical (Kaczmarczyk and Murtough, 2002: 163). As performance is defined as the level of service delivered to clients against agreed standards and targets set out in the service specifications and service level agreements (Atkin et al., 2000: 75; FEFC 1997: 53), the performance measures chosen must reflect a balance between supply and demand. In order to assess value, accurate methods of measuring performance are essential (NHS, 1998: 20). For example, consistency in data collection and the use of common metrics make building-to-building comparisons possible, and allows greater control over the enterprise (Mueller, 2003: 21). The resultant search for value for money is important for the whole spectrum of businesses selling products and services of all kinds (McGregor et al., 1999: 17).

The challenge of facilities management is to minimise the operating cost of physical assets whilst simultaneously delivering a service to maximise value for money (Campbell, 2003: B1.3/2). Thus, there is a need to describe (specify), measure (assess performance), and qualify (price) the output (end products and services). Normally, facilities managers rely upon ratios which provide very little understanding of how facilities operate and how they contribute to core business goals or objectives. The development of generic methodologies to understand the relationship between facilities and core business goals and objectives of organisations in buildings is essential (Loosemore and Hsin, 2001: 474, 475).

Stakeholder Relations and Facility Performance

Following Jones et al. (1998: 5), facilities management must consider the needs of all building users, together with the situation of others who may be affected by the management of the building. Hence, in the case of operation, attention is directed toward the determination of information structures inside organisations, which are treated as “teams”. Although a team – members of an organisation – need to have the same interests and beliefs, they do not share the same information (Philips, 1988: 10). For example, the information that stakeholders circulate (provide and receive) can be imperfect[3], incomplete[4] and asymmetric[5]. According to management theory, it can be reliably assumed that stakeholders to the asset and operation of a building will have different aims, interests, aspirations, competitors, levels of satisfaction and information at their disposal. Part of the task of the facilities manager is to accept these disjunctions and to negotiate workable symmetries into operating situations.

[3] Information is imperfect when there is uncertainty about the actual behaviour of the players or, more generally, when the evolution of the play until the point in time when a new decision is to be made is not known (Philips, 1988: 9).

[4] Information is incomplete when the players do not know some of the elements which define the rules of the game itself (Philips, 1988: 9).

[5] Information is asymmetric when all participants do not have the same information in some markets (Mansfield, 1997: A1), for example, a buyer and a seller possess different information about a transaction (Pindyck et al., 2001: 663).

The 'symmetries' would encompass the standard microeconomic elements of effectiveness (doing the right thing, or using resources to socially valuable ends) and efficiency (doing the thing right, or achieving the defined and desired outcomes with minimum attribution of resource inputs) (Wadley, 2004: 104). In allied terminology, these elements embody the concepts of allocative efficiency (effectiveness), and productive efficiency (efficiency as defined). In order to enable organisations or businesses continuously to improve performance and, hence, add value to organisations and stakeholders, consideration is required of effectiveness as "adding value to business performance" and efficiency as "driving down occupancy costs" (Duffy, 1997). Indeed, details of both effectiveness and efficiency have been widely considered in business operations (Butt and Palmer, 1985; Rutter and Wyatt, 2002: 157). However, the terms refer respectively to aggressive and defensive actions, so a balance between them needs to be struck in any practical setting (Nutt et al., 2000: 91).

The general problem in microeconomic resource allocation is that effectiveness and efficiency also invoke the notion of equity (who gets what, when, where and how) (Wadley, 2004: 104). Even if all stakeholders had the same aim and interests, the resolution of equity in facility operations would be, at the very least, complicated. However, it cannot be assumed that stakeholders display the said homogeneity, in which case not only equity issues but also those in the domains of efficiency and effectiveness can be contested. In these circumstances, the facilities manager walks a fine line among competing interests.

Facility performance is usually measured via performance indicators and by a process known as benchmarking in relation to performance outcomes. Indicators represent a set of measures focusing on the aspects of performance that are most critical for the current and future success of the organisation. The focus, therefore, is either on the aspects of performance that require improvement, or on those which must be kept within a specified level to ensure the continued success of the organisation (Baker, 2002: 10).

Although there are two types of indicators, performance measures[6] and performance indices[7] (Robson, 1994: 2/1), they are both about identifying (Timo, 1997: 4, 5):

- where there is need for improvement,
- how can performance be measured, and
- what changes will bring about improvement.

[6] Performance measures are usually, but not necessarily, a ratio or combination of items that result in a value with units, such as dollars per square meter, work hours per job or operating hours per year (Robson, 1994: 21).

[7] A performance index is a ratio of two performance measures of the same type which reflects standards such as a ratio with a value greater than one indicates above expected performance, and a ratio below one indicates unsatisfactory service (Robson, 1994: 21).

As the success of facilities managers depend on asset performance, they need to determine a set of key performance indicators (KPIs) to help organisations set and reach individual goals, and then use these KPIs to measure the progress made towards achieving these goals – especially when the goals are about to change or need to be improved (Timo, 1997: 6). Although most indicators concern financial outcomes (for example, dollars spent or earned per metre square), there is no single performance indicator for every organisation (Baker, 2002: 10). Facilities managers and management teams need to tailor their own for individual measurements.

These performance criteria together with benchmarks become new standard for designers (Gelnay, 2002: 528). According to the International Benchmarking Clearing-House (IBC) Design Steering Committee in the United States, benchmarking is defined as a process of continually measuring and comparing an organisation's business processes against those used by leaders anywhere in the world to gain information which will help the organisation take action to improve performance (Varcoe, 1996: 44). In addition, benchmarking provides a snapshot of overall performance and allows facilities to be ranked against other facilities of their type, and across facility types (Brackertz, 2002: 179). It is a process of calculating well-defined, comparative figures aiming to measure individual performance against a reference standard, often using a fictitious "best" practice example (Bolhàr, 2003: G2.5/4).

Facilities managers are interested in inter-facility performance within a built environment. However, related benchmarking or comparison are not easy and might require considerable research. Nevertheless, effective, efficient and equitable business achievement in the built environment, first-rate facilities management involves continuous monitoring. All over the world, organisations are acquiring increasing control over their budgets, over their capital programmes and over the way they manage themselves in a cost-effective way (OECD, 1998: 20). Given the structure of an organisation, the conduct of stakeholders invariably incorporates price competition. To optimise performance in the facilities management of buildings to meet stakeholder orientations, consideration of performance outcomes is essential. The better the facilities management, the better the performance outcomes of organisations.

Thus, facilities management has its rationale in performance. In the case of operation, companies maximise their business profits either actively (encouraging revenue among relevant parties) or passively (saving funds and time in routine operation and maintenance). Direct and indirect (side) effects, for example, can be found in a higher ratio of capital per labour, greater longevity (property life cycle) and an increase of local monopoly status. In order to relate performance within facilities management in the built environment with business achievement in terms of performance indicators and outcomes, a list of facility conditions to investigate in different built environments and a suitable building type to demonstrate these conditions become a fundamental requirement.

Facility Conditions and Building Types

Following Atkin et al. (2000: 83) and FEFC (1997: 61), the overall performance of a service provider can be determined by monitoring adherence to standards and targets under different headings:

- conformity to regulations and standards,
- quality- and performance-related targets for service delivery,
- expenditure targets and limits,
- time-related targets, and
- customer-service provider interaction.

These headings urge different organisations to describe their performance in terms of facility conditions that are critical to successful service provision. For example, they recognise the gains from benchmarking with comparable organisations or the use of key performance indicators based on successful building occupancy at the people, process and space interface (Atkin et al., 2000: 75, 132; FEFC, 1997: 54, 97). Specifically, concern attaches to the way process and place can affect people as stakeholders in the building and business operation. People are interested in the process via which facility conditions are combined and managed for business achievement and stakeholder satisfaction. To investigate performance measures in a critical way, a study of building use embodying complex facility conditions is required. In order to measure performance according to the headings as stated above, common facility conditions in the built environment together with its characteristics and supporting reasons are summarised in Table 1.

Facility Conditions in the Built Environment	Condition Characteristics	Supporting Reasons for Performance Measurement
i. multiple stakeholders	internal and external stakeholders who share different ideas, perceptions and imperfect information	request multiple demands
ii. various management issues	present in facilities, products and services for stakeholders	demonstrate the most critical situation
iii. dynamic environment	improvement of flexibility and adaptability for stakeholders	drives facilities and services
iv. large scale	considerable building area/size	contains various facilities
v. open competition	high standard of performance for stakeholder satisfaction	challenges to both management teams and properties
vi. high price elasticity[8]	influences per unit price changes	concerns with budgets, costs and revenues
vii. short lead time	fast response and feedback	requires efficient, effective and equitable actions
viii. significant money at stake	business or financial operations	encourages stakeholders to consider performance

Table 1: Facility Conditions in the Built Environment to Measure Performance

[8] The price elasticity is defined to be the percentage change in quantity resulting from a one percent change in price (Mansfield, 1997: 24, 30; Pindyck et al., 2001: 670).

As facilities management embraces the concepts of cost-effectiveness, productivity improvement, efficiency, and employee quality of life (Cotts, 1999; 7), it is widely applied to the array of buildings, structures, roads and associated equipment – such as universities, industries (Stipanuk, 2002: 5), hospitals, schools, offices, shopping centres and the like – which represents a single management unit for financial, operational, maintenance or other purposes (FMA, 1997: 7). Although all these building types are important for individual businesses, their numbers vary among countries and over time. An example of the changing building types in London during the mid 1990s represented as percentage of total number of buildings is shown in Table 2.

From \ To		Destination Uses					Original Uses Total
		residential	retail	industrial	office	Other	
Original Uses	residential	3.5%	1.2%	0.0%	3.2%	0.6%	8.5%
	retail	1.1%	1.2%	0.3%	2.6%	0.6%	5.8%
	industrial	7.6%	0.5%	1.5%	3.5%	2.3%	15.4%
	office	33.7%	4.7%	0.2%	1.2%	9.6%	49.4%
	other	10.8%	0.8%	0.3%	5.5%	3.5%	20.9%
Destination Uses Total		56.7%	8.4%	2.3%	16.0%	16.6%	100.0%

Table 2: Changed Building Types in London (1990s)

Source: Adapted from Nutt et al., 2000: 180

Comparing the percentages in Table 2 horizontally for the original uses and vertically for the destination uses, it is worth noting that both residential and retail buildings increased from their original levels of 8.5% and 5.8% respectively to destination uses of 56.7% and 8.4%. Other classes, such as, industrial and office buildings declined sharply in importance from their original levels of 15.4% and 49.4% respectively to destination uses of 2.3% and 16%. Only small percentages of original uses remained (in grey cells), for example, 3.5% of residential, 1.2% of retail, 1.5% of industrial, 1.2% of office and 3.5% of the other.

Among these different building types, it is necessary to search for one which provides the appropriate environment to demonstrate as mush facility conditions as possible. To this end, the complexity of facility conditions in the various building types represented by strong (S), moderate (M) or weak (W), are considered in Table 3 (with individual alphabetic references).

Building Types	Facility Conditions								Typical Examples
	i	ii	iii	iv	v	vi	vii	viii	
Commercial	S[a]	S[ab]	S[ab]	M[c]	S[c]	S[a]	M	S[a]	Office Buildings and Towers
Educational	S[bd]	S[b]	S[b]	S	S[de]	S[e]	M	S[bd]	Universities and Libraries
Hygienic	S[df]	S[bd]	S[df]	M	S[d]	S[bf]	S[b]	S[bd]	Hospitals and Laboratories
Industrial	W[b]	S[b]	S[b]	M	S[b]	S[b]	S[b]	S[b]	Factories and Warehouses
Recreational	S[d]	S[g]	M[g]	M	M[g]	S[g]	S	S[d]	Convention Centres, Exhibition Centres, Sports Complexes and Stadiums
Residential	M	M[b]	M	M	M	M	S	S	Apartments, Hotels and Resorts
Retail	S[h]	S[h]	S	S[h]	S[i]	S	S[h]	S[b]	Shopping Centres
Rural	W	M	M	S	W	W	W	M	Farms and Gardens
Transport	S	M	S	M	M	S	S	S	Airport and Bus Terminals, Car parks and Rail Stations

Facility Conditions:

i – multiple stakeholders
ii – various management issues
iii – dynamic environment
iv – large scale
v – open competition
vi – high price elasticity
vii – short lead time
viii – significant money at stake

Complexity:

S – condition applies strongly
M – condition applies moderately
W – condition applies weakly

Table 3: Complexity of Facility Conditions across Different Building Types

Although no information is provided to benchmark individual facility conditions across different building types (reading Table 3 vertically), there is evidence to show that only one form – the retail shopping centres – is rated strongly on all the necessary conditions (reading Table 3 horizontally). Hence, retail shopping centres should provide a suitable milieu in which to demonstrate all facility conditions for the study of performance optimisation in facilities management.

[a] Arge, 2003: G2.1/1-7
[b] McGregor et al., 1999: 229, 230
[c] Warren, 2003: G5.3/1
[d] Loosemore et al., 2001: 467-471
[e] OECD, 1998: 20-21
[f] Wagenberg, 1989: 66, 67
[g] Jones et al., 1998: 52, 102, 103, 241, 242
[h] Cowling, 1995: 25
[i] Anon., 1995: AM9

Best Match against Best Practice Approaches

According to the imperfect, incomplete and asymmetric information among stakeholders, it is fundamental for an organisation to understand the give and take (supply and demand) actions among business stakeholders, for example, owners, managers and sometimes tenants, and consumer stakeholders, for example, customers and sometimes tenants. Indeed, an organisation which spends too much budget and time in low importance products or services will lead to waste, or vice versa stakeholder dissatisfaction. Traditionally, business stakeholders are the key stakeholders to be satisfied. However, increasingly more organisations are considering consumer stakeholders as their target stakeholders (Balachandran, 1999; Bandy, 2003: 322; Loosemore, 2001: 464). The problem is how to have a balanced solution among all stakeholders in an organisation.

In addition to the best practice[9] approach, which has been widely applied in organisations for years, the concept of a best match approach can be developed. In order to have an effective, efficient and equitable outcome, it is better for an organisation to:

- have a stakeholder analysis and target for a key stakeholder,
- understand what key stakeholder want and compare them with those of other stakeholders' to see the similarities and discrepancies,
- decide which products and services are in need and deliver them to all stakeholders,
- measure the organisational performance occasionally and benchmark the results with other best practice organisations,
- study organisational strengths and weaknesses, and consider any opportunity or threat,
- repeat the process continuously to deliver tailored items to key stakeholders so as to optimise organisational performance.

This best match approach is gaining favour by benchmarking or correlating the requirements of a key stakeholder with other stakeholders to study their similarities or discrepancies and decide which products and services are to be delivered. Measuring the organisational performance with others is helpful to study individual situations. It is necessary to apply both best practice and best match approaches simultaneously within the organisation to achieve continuous improvement. The advantages and disadvantages of these two approaches are compared in Table 4.

[9] The best practice is a co-operative way in which organisations and their employees undertake business activities in all key processes: leadership, planning, customers, suppliers, community relations, production and supply of products and services, and the use of benchmarking. These practices, when effectively linked together, can be expected to lead to sustainable, world class outcomes in quality, customer services, flexibility, timeliness, innovation, cost and competitiveness (Baker, 2002: 167; Timo, 1997: 37-38).

Approaches	Advantages	Disadvantages	Recommendations
Best Match	• learn more from target stakeholders • satisfy what target stakeholders want • more effective and efficient to deliver items to target stakeholders	• may not achieve highest organisation performance • items delivered may not be the same as those from organisation strategies or policies	• good for performance measurement before item delivery • study the similarities or discrepancies and get ready for the next best practice approach
Best Practice	• maximise organisation performance • items can be delivered directly according to organisation strategies or policies	• lack of communications with target stakeholders • may not fulfil what target stakeholders want • less effective and efficient to deliver items to target stakeholders	• good for performance measurement after item delivery • study the similarities or discrepancies and get ready for the next best match approach

Table 4: Comparison of Best Match and Best Practice Approaches

Conclusion

Facilities management is increasingly important in business achievement among stakeholders (people), their strategies or actions (process) and organisation environments (space). Performance in facilities management constitutes a new challenge. Current trends in the discipline involve different ideas and perceptions from specialists and professionals. To this end, a suitable building type (retail shopping centres) was selected to demonstrate complex facility conditions to further study performance optimisation. Meanwhile, a best match approach is to be applied alternatively with the best practice approach in the organisations for continuous improvement.

This paper has completed a range of tasks including understanding the built environment and facilities management, discussing stakeholder relations and facility performance, considering complex facility conditions and searching for suitable built type to demonstrate these conditions, introducing a best match approach and describing pros and cons between the best match and the best practice approaches.

References

Anonymous (1995) *Double Duty: Managers and Marketing.* Chain Store Age. Volume 71, Issue 4, pp. AM8-10.

Alexander, Keith (1996) *Facilities Management: Theory and Practice*. London & New York: E&FN Spon, 1st ed.

Amaratunga, Dilanthi and Baldry, David (2000) *Assessment of Facilities Management Performance in Higher Education Properties.* Facilities. Bradford: Volume 18, Issue 7/8, pp. 293-301.

Arge, Kirsten (2003) *Adaptable Office Buildings – Theory and Practice*. The European Facility Management Conference. 14-17 May, Rotterdam, The Netherlands, pp. G2.1/1-7.

Atkin, Brian and Brooks, Adrian (2000) *Total Facilities Management*. Oxford: Blackwell Science.

Baker, Trischa (2002) *Key Performance Indicators Manual: A Practical Guide for the Best Practice Development, Implementation and Use of KPIs*. Crows Nest, N.S.W.: Allen & Unwin.

Balachandran, S. (1999) *Customer-Driven Services Management*. New Delhi: Response Books.

Bandy, Nancy M. (2003) *"Setting Service Standards: A Structured Approach to Delivering Outstanding Customer Service for the Facility Manager"* Journal of Facilities Management. Volume 1, Number 4, pp. 322-336.

Bolhàr, Andreas (2003) *Hermes: An Innovative Real-Estate-Management-Philosophy.* The European Facility Management Conference. 14-17 May, Rotterdam, The Netherlands, pp. G2.5/1-7.

Brackertz, Nicola (2002) *Moving towards an Integrated Facilities Management Tool to Evaluate Facilities for Service Performance in Local Government. Applying and Extending the Global Knowledge Base*. Proceedings of the CIB Working Commission 070, Facilities Management and Maintenance, The 2002 Global Symposium, CIB Proceedings: Publication 277, pp. 168-182.

Butt, H. and Palmer, B. (1985) *Value for Money in the Public Sector: The Decision Maker's Guide*. Basil Blackwell.

Campbell, Jeremy (2003) *"Putting the Customer Back in the Driving Seat: New Rules for the Benchmarking Garage"* The European Facility Management Conference. 14-17 May, Rotterdam, The Netherlands, pp. B1.3/1-10.

Cowling, Phil (1995) *"Precise Monitoring of Public Buildings"* Facilities. Bradford: Volume 13, Issue 1, pp. 25-27.

Everards, Gea and Favier, Paul (2003) *"Corporate Integrated Resource Management"* The European Facility Management Conference. 14-17 May, Rotterdam, The Netherlands, pp. G5.1/1-6.

FEFC (1997) *Effective Facilities Management: A Good Practice Guide*. The Further Education Funding Council (FEFC) in collaboration with the National Audit Office (NAO). London: Stationery Office.

FMA (1997) *Glossary of Building Terms: Facility Management Terms.* Facility Management Association of Australia (FMA). [Homebush, NSW]: Standards Australia. SAA HB50 Supplement 1.

Gelnay, Ben (2002) *"Facility Management and the Design of Victorian Public Hospitals" Applying and Extending the Global Knowledge Base.* Proceedings of the CIB Working Commission 070, Facilities Management and Maintenance, The 2002 Global Symposium, CIB Proceedings: Publication 277, pp. 525-545.

Grimshaw, R. W. (2002) *"FM: Exploring the Professional Interface" Applying and Extending the Global Knowledge Base.* Proceedings of the CIB Working Commission 070, Facilities Management and Maintenance, The 2002 Global Symposium, CIB Proceedings: Publication 277, pp. 3-13.

Jones, Christine and Jowett, Valerie (1998) *Managing Facilities*. Oxford [England]; Boston: Butterworth-Heinemann.

Kaczmarczyk, Stan and Murtough, Judi (2002) *"Measuring the Performance of Innovative Workplaces"* Journal of Facilities Management. August, Volume 1, Number 2, pp. 163-176.

Loosemore, M. and Hsin, Y. Y. (2001) *Customer-Focused Benchmarking for Facilities Management* Facilities. November/December; Volume 19, Number 13/14, pp. 464-475.

Mansfield, Edwin (1997) *Microeconomics*. New York; London: W. W. Norton & Company. 9th ed.

McGregor, Wes and Then, Danny Shiem-Shin (1999) *Facilities Management and the Business of Space*. London: Arnold.

Mueller, Stacy (2003) *"Web-Based Tools: Using the Internet for Facility Performance Monitoring"* *Corporate Real Estate*. May. CoreNet Global. pp. 20-22.

Muther, Richard and Hales, Lee (1979) *Systematic Planning of Industrial Facilities (SPIF) Volume 1 and 2.* Management and Industrial Research Publications.

NHS (1998) *A Business Approach to Facilities Management*. Department of Health, National Health Service (NHS) Estate, London: The Stationery Office.

Nutt, Bev and McLennan, Peter (2000) *Facility Management: Risks and Opportunities*. Oxford: Blackwell Science.

OECD (1998) *Facilities for Tertiary Education in the 21st Century*. Paris: Organisation for Economic Cooperation and Development (OECD).

Payne, Trevor (2000) *Facilities Management: A Strategy for Success*. Oxford: Chandos Publishing Oxford.

Philips, Louis (1988) *The Economics of Imperfect Information*. Cambridge University Press.

Pindyck, R. S. and Rubinfeld D. L. (2001) *Microeconomics*. Jonathan H. Hamilton. Upper Saddle River, N.J: Prentice Hall. 5th ed.

Robson, Peter (1994) *The Application of Performance Indicators in Facilities Management in Institutions of Higher Education.* Contemporary Issues for Facilities Managers. Facilities Management Reference Group, Australian Vice-Chancellors' Committee, pp. 2/1-7.

Rutter, D. K. and Wyatt, D. P. (2002) *Best Value Through Whole Life Performance* Applying and Extending the Global Knowledge Base. Proceedings of the CIB Working Commission 070, Facilities Management and Maintenance, The 2002 Global Symposium, CIB Proceedings: Publication 277, pp. 155-167.

Stipanuk, David M. (2002) *Hospitality Facilities Management and Design. 2nd ed.*

Timo, Nils (1997) *Key Performance indicators in Enterprise Bargaining: a Guide for managers and Employee Representatives*. Good Employment Practice Series, North Ryde, N.S.W.: CCH Australia Ltd.

Varcoe, Barry J. (1996) *Business-Driven Facilities Benchmarking* Facilities. Volume 14, Number 3/4, pp. 42-.

Wagenberg, Andreas F. van (1989) *Post-Occupancy Evaluation of General Hospitals and Other Buildings: A Tool for Facility Managers as well as Architectures and Their Advisors First International Symposium on Facility Management*. International Facility Management Association. May 11-12, 1989, Washington, D. C., USA, pp. 65-77.

Wadley, David (2004) *Social Welfare and Urban Design: Advancing Planning and Development through Visual Prominence Assessment.* A Dissertation at the University of Queensland.

Warren, Clive M.J. (2003a) *Office Density and the Innovative Workplace The European Facility Management Conference*. 14-17 May, Rotterdam, The Netherlands, pp. G5.3/1-11.

Warren, Clive. M. J. (2003b), *New working practice and office space density: a comparison of Australia and the UK*. Facilities;Vol.21 No.13/14 pp:306-314