Original title: *Facility management. Progettare, misurare, gestire e remunerare i servizi*

Indice

Service is a social process. The management is the ability to direct social processes. Service companies are sensitive to the quality of their management probably more than any other type of organization. An important role of management is to identify the critical factors that allow a particular service system to function and design effective methods to control and consolidate these features in a concrete way. If the various components do not work in a proper way, no big project will succeed.

Richard Normann, *Service management. Strategy and leadership in service buniness*, Wiley, Hoboken, NY, USA 1991

Preface

This book is the result of research, training and consultancy carried out by the authors as part of the Laboratory of GestiTec Politecnico di Milano. This activity dates its beginnings to 1989, when by a major national insurance company began a research, completed in 1990, concerning the "total cost of ownership" of a significant number of buildings.

The research results allowed our team to acquire a comprehensive framework on operating costs of some buildings divided by type: with surprise we noticed that operating costs were really high in relation to buildings overall cost and their market value.

At the same time a research on international papers and documents about building management was launched; it soon enabled us to find out how building management activities were fully developed in the Anglo-Saxon world (UK, US) and how these issues under the name of "Facility management "were the object of systematic investigation and academic-scientific publications.

In June 1995 at Politecnico di Milano was launched the first course devoted to Facility Management, which title was "Building Management. The management of buildings and real estate assets: technical, organizational and economic issues".

Since then the educational activity on the subject has never ceased.

In recent years our work has continued thanks to the important contribution of many private companies and association such as Assolmbarda.

These partners have offered valuable opportunities for planning, training and researching within the field of Facility Management.

It is therefore thanks to them that university activity can grow in its ability to carry on research, transmit knowledge and thereby compete at national and international level, which is one of "our" Politecnico objectives.

1 Facility Management: theory and practice

Before delving into Facility Management it is necessary to clarify the concept, which assumes very different nuances according to the different traditions and markets of the countries in which it is applied.

Facility Management is a U.S. derived practice, then imported into other countries of the world characterized by the presence of an advanced service. There are many definitions, below we indicate the best known.

According to the widely accepted definition in 1982 by the United State Library Congress of the United States, Facility Management means: 'The practice of local / workspace coordination with the organization of the lost-they and their various activities; it integrates the principles of administration, architecture, psychology, engineering and economics"[1].

Fig. 1.1 represents Facility Management as: "The practice of co-ordination and management that integrates the tasks and functions to" individuals, processes, places "within the enterprise or organization"[2].

According to IFMA[3] (International Facilities Management Association), Facility Management is: «The practice of co-ordination between the place of work, the user and the type of work done by the companies; it integrates the principles of administration, architecture, psychology and engineering»[4].

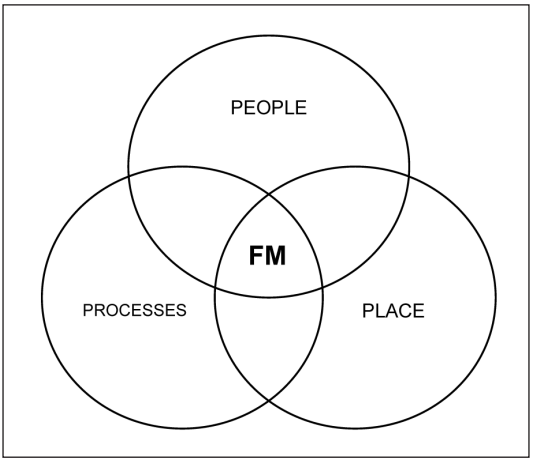
This definition can be schematically represented as in Fig. 1.2.

1. Rondeau E.P., Brown R.K., Lapides P.D. (1995), *Facilities Management*, John Wiley & Sons, New York, p. 3.

2. *Ibid*.

3. Ifma (International Facilitiy Management Association), founded in 1980, promotes the philosophy of "efficient workplace, effective, safe and on a human scale". Silicon Valley chapter of Ifma, 1982.

4. *Ibid.*



Source: Rondeau E.P., Brown R.K., Lapides P.D. (1995)

Fig. 1.1 – *Areas of facility management interest*

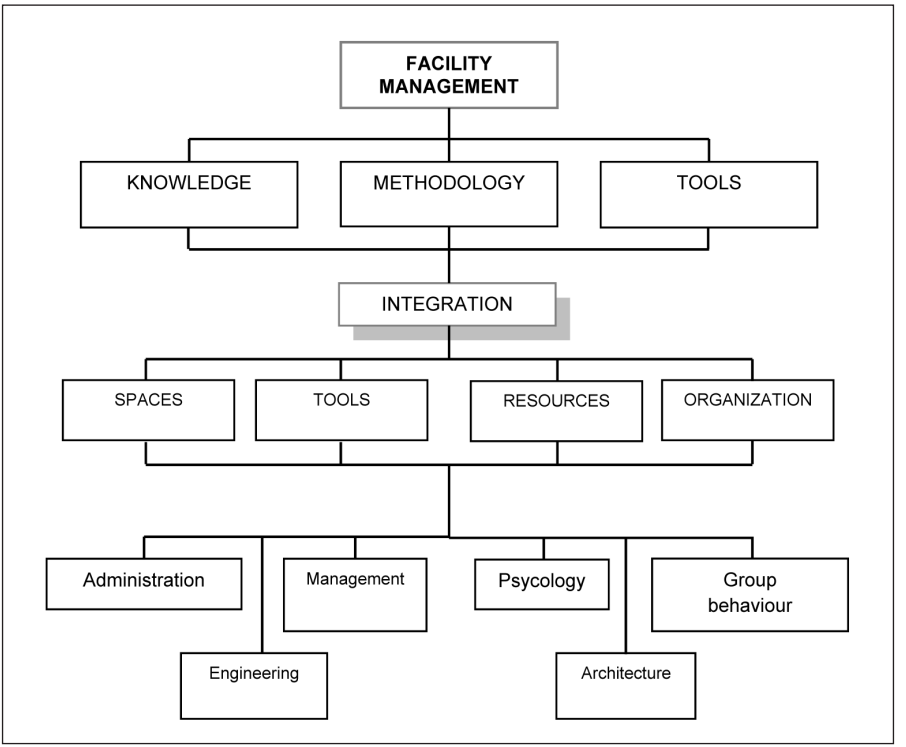


Fig. 1.2 – *Facility Management activities*

It is therefore evident that a Facility Manager has several responsibility, and should address multiple tasks[5]:

– the development of facilities of the company and their strategic planning;
– the coordination of redevelopment processes;
– supply management, relations with suppliers, the management and control of the services / facilities provided by them;
– supervision (planning and control) of all activities maintenance, improvement and re-engineering of the building / real estate systems.

Normally Facility Management services are divided into: building services, organization services, services to the people. Typically between Facility Management services we can mention: maintenance of technological systems, construction activities, internal transport, cleaning, green areas maintenance, canteen, security, waste disposal[6].

Another definition helps us to articulate further the concept of Facilities Management: "Facility Management is the management, the physical structure of the building and its systems / equipment to be optimized connection between any type of business-management process and pro-end product: the functionality of the building. The product of Facility Management can be represented by a tangible service; in this case, the 'product building-workspace' earns in competitiveness and quality".

According to the definition of an Italian author: "Facilities mean a whole range of structures, components heads, communication, transport, cleaning, catering departing or revolve around building complex, so the facility management concerns design and the management of all tasks and processes that occur in the space of a building life"[7].

According to a well-known american author: "Facility Management represents an evolving strategy. The use of a building does not remain static over time; technologies change, products change, the business responds to the market then Facilities Managers must monitor and implement remedial action whenever the reporting of trends seem to indicate that the operations relating to the management of the building are moving away from planned levels"[8].

5. Tronconi O., Ciaramella A. (2006), *Manuale del Facility Management*, Collana Real Estate, Il Sole 24 Ore, Milano.

6. Park A. (1994), *Facilities Management an explanation*, MacMillan, London, p. 1.

7. Porta L. (1996), "Il Facilities Management e la pianificazione integrata", *Office Layout*, 67: 50.

8. Park A. (1994), *op. cit.*, p. 22.

[Il] Facility Management (FM) is a strategy, a growing profession for all who have to do with the management of properties and of all the goods contained therein. It is a field of activity that takes into account the concepts of design, location and construction of the buildings, a facility / service with attention to the way in which it is used and how well it evolves over time depending on the capacity to respond to the demand for change expressed by the user[9].

And again on Facility Management «Facility Management is recognized and affirmed above all thanks to its "effects", first of all transactions involving the acquisition, design, construction and maintenance; then again thanks to the services and support operations to internal users and finally thanks to the presence of the physical facility»[10].

All definitions presented here emphasize and highlight, every time, just some of the activities that can be attributed to Facility Management. Synthesizing, we can say that Facilities Management refers to activities that aim to create a safe and pleasant productive work environment that can respond to the long and short target period of enterprises and organizations.

It is clear that Facility Management encompasses a wide range of activities ranging from strategic planning services, the definition of its cost budget, from architecture to engineering, programming maintenance activities, workspace, including project management, renovation projects or new functions and, in general, the management of all the services necessary for the building, the organization and the people who are part of it.

It should be stressed that all these activities, now more than ever, are characterized by an increasing complexity and pose a growing challenge due to the changes taking place in business and organizational process. In fact, the continuous technological and market evolution requires extreme variability and higher quality in office work, while constantly emerging new regulations in the security of people in the workplace, in the features and functionality of all the technological systems.

9. *Ibid.*

10. The Facility Manager has many responsibilities; its tasks include:
- the development of the Facilities of the company and their strategic planning;
- the coordination of redevelopment processes;
- supply management, relations with suppliers, the ge-ment and control of the services / facilities provided by them;
- supervision (planning and control) of all the maintenance, upgrading and re-engineering of the building / real estate systems.

Rondeau E.P., Brown R.K., Lapides P.D. (1995), *op.cit.*, p. 7.

1.1. Definition

Facility Management (FM) is therefore that system of knowledge, methods, tools, enabling the optimum management of all the services for buildings/real estate assets, in close relation to the user's needs.

In particular, the practice of coordination of space/equipment at work with human resources and their overall organization (objectives, responsibilities); it integrates principles of administration, business management, architecture, engineering, psychology and knowledge of group behavior.

Normally Facility Management services are divided into: building services, services to the organization, services to the people. Typically between Facility Management services we can mention: technological installations operation and maintenance, electrical, special, networks, construction activities, internal transport, cleaning, maintenance green areas, canteen, security, supplies, waste disposal, and many others.

1.1.1. Services delivered to people

These are activities that aim to increase productivity, well-being and loyalty of those who work for the company and/or useful to the comfort of visitors.

Indicatively, the services may include: the restaurant business in its various forms – cafeteria, dedicated catering, meal service at the workplace; the break areas management; cleaning and environmental hygiene, rodent control and pest control. These services can be articulated: laundry service for employees, management of vending machines, nursery service, gym and fitness, etc.

1.1.2. Services delivered to organization

The objective of this family of services is to make sure that the workspace can be a useful infrastructure for the company, facilitating the creation of value, the processes of communication, socialization and the creation and circulation of knowledge. As you can imagine, then, this group of activities has a high level of complexity from the organization's point of view.

Among the services usually present: document management, management of the company car fleet, management of stationery;

organization of the reception and concierge, management accounting, payroll and contributions; post office and document reproduction, etc. Even the logistic activities may fall into this family.

This is the most activities that play a role and support staff to the core business of companies.

1.1.3. Services delivered to spaces and buildings

This area encompasses all activities aimed at the maintenance of the property and all its plants and facilities. The ultimate goal of these services is to ensure continuity of operation of the building inte-know as "container" within which the company conducts its business in compliance with the regulations on health of the workplace, the safety and the rational use of energy.

Building services are those related to the maintenance of all the technological units of the property, both internal and external, such as maintenance of electrical, mechanical equipment, elevators systems, civil maintenance, maintenance of firefighting equipment, maintenance of green internal / external, etc.

In recent years, the focus on property services has increased considerably: it has developed, in fact, aware that the process maintenance and management, as well as ensuring conditions of viability and efficiency, helping to preserve the property value.

This family of services is particularly significant for manufacturing enterprises with high technological value, in which it has a special integration between building and production plants.

1.2. The evolution of Facility Management

The increase of market competition have reinforced more and more over time the trend to outsourcing of auxiliary production facilities, provided that such services are provided on acceptable quantitative levels, guaranteeing cost savings and allow the possibility of a monitoring and systematic control by the contractor, therefore a continuous reporting of the results achieved: higher quality services guaranteed at a lower cost and always under control.

Unlike the past, when everything was "homemade" – that is, the vertical integration of all the factors of the production cycle, it is no longer necessary to carry out all activities related to the management of an

organization / enterprise within itself; globalization, the high competitive markets, the fall of a number of political and geographical barriers require a transformation in the way an efficiency of enterprises.

The task that remains within the company is the control of the results, while what is deleted are unnecessary costs: indirect and direct internal costs arising from procedures / activities that occur only once are transformed into variable costs (costs external).

So: better outsourcing or facility management? The answer is different for different countries and circumstances: "In Europe, for example, the tendency seems to be to give in outsourcing various services that make up Facility Management; can be said that in Germany this is the rule […] in the United States, however, the situation is different: traditionally, in fact, the management services of real estate are assigned (in terms of responsibility) to defined domestic professional within the company"[11].

It is therefore difficult to say in general what is the best solution because: "What matters is to satisfy customers, whether internal or external to your organization […] anyway outsourcing does not always mean saving money, sometimes it can also be more expensive and often the level of competence necessary to carry out this task can be more easily found within the company"[12].

In this regard United Kingdom presents an evolution similar to that of US, and companies are increasingly often faced with the strategic choice to decide whether and what to outsource, and what manage within the companies.

For this purpose it is useful to remember that there is a difference between outsourcing and out-tasking; the first involves a total outsourcing of functions / services, while the second term refers to the activity of contracting outside just part of the services.

In any case, an organization should not outsource facility services without adequate preparation, choose a proper contractual setting, select the vendor based on specific criteria-parameters and be able to systematically monitor performances. For this reason, both the services fully-outsourced to companies that offer facility management services, whether they are carried out as an in-source solution, increase the importance of a professional, the Facility Manager, who has the ability to manage relationships with suppliers, check continuously the results of their activities and plan and control the process of delivered services.

11. Pantanida P., "La vita al Facilities Management", *Tempo Economico*, 364: 68.
12. *Ibid.*

1.3. Facility management: the starting point

Until the ’70s in the US we speak of Facility Management, but without a clear focus of content and a universally accepted definition.

In the ’80s, that can be considered the decade of development and maturity of Facility Management, we are witnessing the birth of associations, the definition of various training programs at the university level, the growth of industry publications; all measures to promote and definition of facility management culture aimed at providing a contribution to the market for the rationalization and clarification of concepts and the growth of the necessary standards of professionalism.

This generation of Facility management has focused its attention on all the activities in which every day you come across within an organization. Early efforts have verified the existence of different “risk areas” (personnel management, the introduction of new technologies and their continuous implementation, the need for energy savings with the guarantee of air and environmental quality internal) and thus the need for large restructuring efforts to integrate and solve these needs in the working environment.

In the late ’80s, however, there has been a period of strong economic recession. An immediate reflection of the market discontinuity is determined within organizations; New terms have characterized the language of business and focused attention. “Reingeneering, recostructuring, reinventing, downsizing, rightsizing, smartsizing” are all expression of organizational/technological concepts, not only in US, representing a single trend: the drastic reduction of the company’s employees to be able to make a reduction significant management costs.

The American market, like Europe, has been faced with a situation of extreme change which was, and is still responding, with adequate organizational-technological and innovative management concepts.

A partial solution to this situation was offered in American, north European and Japanese companies, by the new method of workspaces management, “hotelling, telecommuting, virtual offices”: these concepts and organizational practices in Italy tend to face significant obstacles mainly because of widespread cultural resistance and unfavorable economic phase to real estate investments on the part of all industrial sectors.

The effects of the economic downturn and the continuous development of ICT (Information Communication Technology technologies) continue to favor the change taking place and lead to radical reinterpretation of some managerial and organizational practices, which have long been the only universally accepted practices and possibilities.

The starting point is to be found in a definition coined in 1980: «Someone else does what I do»[13], that is, someone else does what – if I did I – I would waste resources and energy, and would distance me from my main activity.

In summary, in the American and Anglo-Saxon world, both the demand for Facilities Management that the offer by companies specialized integrated services (Total Facilities Management) have a well-established structure. For some time Facilities Management contracts have been started by a number of companies, while the presence of vocational training programs at different levels of education plays a decisive role in the preparation of resources and in particular of Facilities Managers.

1.4. Facility Management in Italy

The Italian situation is vastly different than that previously described. It is in the process of structuring, both as regards the demand, that the supply.

Our country comes from a tradition in which real estate has long been a little economic value controlled and managed, so that enterprises and institutions that have operated over time real estate investments, today are having to manage assets whose characteristics and whose "state of affairs" are often barely known. This is especially evident in the case of real estate assets belonging to public institutions, but also in the case of some large private organizations. In general, the state of the Italian real estate is characterized by a management that does not allow to get a good economic performance, and then the property demonstrates a widespread lack of interest in the conditions (maintenance status) of the buildings in time. The immediate consequence is that our country is generally characterized by a vast degraded real estate assets, with little ability to adapt to new demands (technology, safety, comfort) except through substantial investments.

Unlike the American situation, in which the average life of a building is around 20-30 years, after which it exhausts its profitability and is necessary to make a radical redevelopment to make it again interesting for the market, in Italy, by culture and tradition, buildings tend to "live" longer and therefore it is essential a more efficient program in managing their economic performance.

The major causes of physical decay of buildings are to be found in economic factors: "the design is considered one activity with the purpose of minimizing building costs and plant construction, as well as reducing the costs as possible in the short term without no consideration for the

13. "Qualcuno fa quello che io faccio".

usability and efficiency of the space, the structure and plants in the long run"[14]. Even with a superficial examination is perceived as the amount of real estate assets under obsolescence has a very significant dimension in several italian cities.

One of the reasons why in Italy Facilities Management experiences a widespread interest is therefore linked to the need to respond to the imperative of the decrease in operating costs and the need to redevelop the spaces of commercial buildings by making them dynamic and functional.

Many buildings were built in the '70s and '80s and today go to new functions according to the emerging needs above all technologies character and to regulatory developments: new systems and structured cabling, to respond to the widespread computerization of the work environment. It is now common reality the use of ICT, the internet connection, the need to equip each location with PC work space must be flexible and functional, and the cost of this change should be low and quickly programmable.

In fact, the mutability of assets, the transformation of organizations emphasizes the need for space/property able to be variable and flexible compared to occupants needs.

The reference model becomes that of "'intelligent building" able to transform, adapting (a new computer, connect to the corporate LAN, a new phone, a new desk, etc.) to organizations needs.

A situation like this has pushed the entry into the Italian market of companies, mostly international, dealing with the supply and management of these services.

1.5. Some problems

The objectives they pursue the utilization of Facility Management services by italian companies can be summarized as follows:

– reduction in operating costs;
– reduction of maintenance costs;
– timeliness in the performance of services;
– higher quality.

The transition from one management with internal staff to a solution involving an external organizations has allowed to address the problem of contracting costs and increase the timeliness of services, sometimes also their quality, but it certainly has not solved the problem.

14. Tronconi O., Ciaramella A. (2006), *op. cit.*

Fig. 1.3 – *Some of the reasons that led to the birth of Facility Management in Italy*

1.5.1. Not only outsourcing

Some organizations simply, or rather simplistically, thought that with the outsourcing of services you could solve all the problems, from management to the quality of performance costs. In many cases, to outsource the management was also identified as a solution to personal problems, redundant or retrained: definitely a wrong way to conceive the transition from an internal management use of Facility Management services.

Facility Management is not in fact simply the transition from reliance (or accomplishing) of specialized or partial services to a layering of services (the so-called multi-service contract), but a new, more advanced methods of integrated management of all related activities for optimum operation of a building or a real estate portfolio: «the goal must be to create a strategy that is realized in the construction of a transparent and effective strategic partnership with the selected supplier»[15].

15. Brandle F. (1996), "Relazione al Corso di Aggiornamento in *Building Management*, II Edizione", Politecnico di Milano, Milano.

For this kind of task the selected partner must ensure the following requirements:

– adequate organization;
– coordination skills;
– technical skills;
– financial reliability;
– contractual reliability;
– experience in the field;
– extreme computerization of processes;
– remarkable reporting capabilities.

Fig. 1.4 – *The need for a correct integration of services*

1.5.2. Intelligent building, performances and services

The outsourcing of services to suppliers can ensure, if well organized, planned and provided, to select one or more suppliers appropriate to achieve economies of scale in the use of technical and human resources. But, over time, the possibility of reducing the cost of services is inevitably less.

This makes us realize how important, in setting activities that fall within Facility Management, strict attention to quality and design is necessary to get by this type of services.

It is therefore necessary to focus attention not only on costs but, above all, on strategic objectives as regards this type of services, in order to obtain advantages such as:

- possibility, through outsourcing, to focus on core business;
- possibility to obtain greater flexibility in a wide range of variable services in time (this thing that allows to deal with greater ease problems and emergencies);
- significant reduction of the variability of costs of services and therefore possibility to plan for the real estate running costs budget on the basis of a very small variation range, yet close to actual costs.

Organizations have a strong need to achieve greater flexibility in the real estate services to be able to cope with the increasing variability of the business and the resulting changes.

In the past, in our country, the outsourcing of facility management services was considered a possible organizational decision to reduce business costs; the experiences have shown that this setting is wrong in substance and can lead to negative situations.

The economic importance of building management emerged in the evidence from the comparison between construction costs and operating costs over the entire life cycle of the property. To cope with this problem, it must first design and build buildings with high performance and simultaneously define and predict all the maintenance activities and support services needed to maintain the performance of the building over time; both when intending to proceed with the outsourcing of services, but when it deems it appropriate to use an internal structure or a devoted company, as a part of the "client" holding.

In the more advanced experience designing Facility Management services and structures able to deliver them happens just simultaneously with the stage of building design.

This awareness is more widespread among the great owners and users of real estate and it is on this basis that has developed in the most advanced countries, an approach to the construction of buildings based on the integration of all global plant: engineering, security and safety devices, environment, based on a defined technological model so-called "intelligent building". A technological model which involves a dynamic management of all the technological and plant equipment installed in the building, which is a management linked to the actual method of the building use and the conditions of the external environment.

An intelligent building will therefore be a structure capable of offering the highest possible efficiency on the basis of the technology available today and, at the same time, to reduce the management cost.

Not surprisingly, the most advanced experiences in the design and construction of commercial buildings suggest to evaluate the characteristics of a building on the basis of four key performance areas highlighted in the chart below.

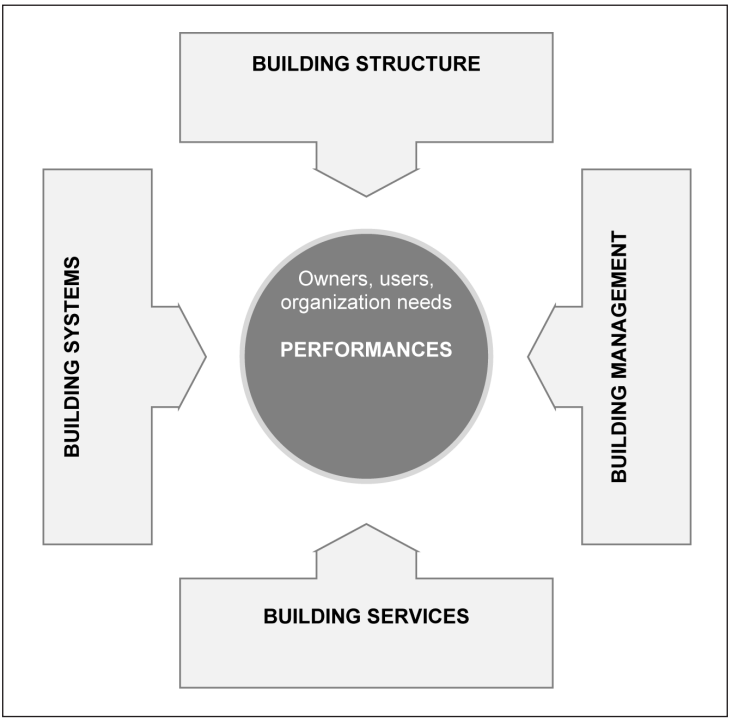


Fig. 1.5 – *Some performance characteristics of an intelligent building*

Tab. 1.1 – *Some performance characteristics of an intelligent building*

Building Structure
Storey height Available height between the ceiling slab and the false ceiling, Available height between the raised floor and the slab, Available height between the raised floor and the ceiling Accessibility vertical cable systems and distribution plans (electric lighting, voice communication, data, images, Office Automation, intruder detection system, fire smoke detection system) for maintenance and expansions or modifications Access to ducts and equipment of technological systems (HVAC, electrical-FM, lifting equipment, water and sanitary system, automatic fire extinguishing system)

Tab. 1.1 – *segue*

Openings: Opening systems of doors and windows, curtain wall, accessibility for maintenance/cleaning systems Special finishes: anti-skid systems and accident-prevention and fire-resistance criteria (in their range of finishing materials) …
Building Systems
Heating Ventilation and Air Conditioning (HVAC) Lighting and motive power System / cabling Elevators, escalators, elevators Water and sanitary system and domestic hot water Access Control Security system (security and safety) System of communication (voice, data, images) System of control and management of technological systems Information technology distribution system UPS and generator
Building Services
Voice communication system, data, images Office Automation and e-mail Meeting and outbuildings labor offices equipped with the necessary technologies Computer / telematics Systems of printing and photocopying Voice broadcasting Access control and access to the car park Security and safety system Support staff for conducting activities outside normal working hours and/or unplanned (secretarial, data processing, faxing, etc.) Cleaning and minor maintenance works Training activity Removals and movement of mobile walls and furniture, repositioning of telephones and electronic equipment New telephones and computers installation
Building Management
Management of the building maintenance, plant engineering and C.I.B. ordinary and extraordinary maintenance Economic and financial managemet of the interests and pro-ownership strategies Technology Management (distributed computing and communication systems, security – security and satfety –, control and management of HVAC, lighting and FM system, lifts, etc.). Energy Management (management and energy saving) and Efficiency Reports Management services for organizations and for building occupants/users

1.5.3. The lack of information

One of the features that distinguishes the management of public and private real estate of our country is the lack of information. Very often there are some data, but there is no certainty on the criteria by which they were collected.

In Italy it is still uncommon practice to achieve a constant monitoring of the performance of real estate assets and only some organizations specifically oriented to the real estate business, such as Real Estate Investment Trusts, Property Companies and corporations, systematically carry out these activities.

In this narrow range of operators, reporting systems aimed at the control and measurement of technical and economic performance of the leading facility management services, are adopted.

Finalize Facility Management strategies at the single variable "costs" causes a decrease, a debasement of the real potential of Facility Management. The companies oriented towards the acquisition of the Facility Management services must think carefully about the objectives they seek to pursue and based on their knowledge; above all, they must fully understand that "you can not manage what you can not measure".

1.6. Facility Manager role and resposibilities

Unlike international companies, is to be noted that in Italy so far «there is no precise definition of the Facility Manager role and responsibilities and position in the company, there is no common language, a common experience that identify precisely this role […] Italian companies in this activity is mainly carried out by the Head of General Services, which often responds to the Director of human resources»[16].

This role is usually done by people without a proper preparation and cultural background, often it involves technical or simply "administrative", or even people who, living in the company for many years, have the historical memory of the building, but they have no powers decision: "This implies the impossibility of an overall assessment of the real estate assets at the expense of a program of activities, a reduction in operating costs and above all the lack of proper investment in order to strengthen the real estate return[17].

16. *Ibid*.
17. *Ibid*.

1.7. The relationship between demand and supply

In summary, the Italian situation can not yet rely on an established and structured practice.

– The demand is located in front of the need to clarify and focus attention on their state of the art, in order to formulate which are the needs for optimizing the performance of real estate properties, so as to start from within the process of re-engineering and restructuring of resources. It is necessary to take into consideration the problem can not be solved simplistically by means of a "sale to third parties".
– The supply is faced with the need and urgency of a comprehensive adjustment of its structure: suppliers must move from an offer of "partial services", that means parceled (cleaning, maintenance, installation) relatively simple, with a "global service", guaranting the complexity of the property, according to the model already existing abroad: the Total Facility Management (TFM). It represents the collaborative/partnership, contractually defined and structured in time, supply and demand.

For the suppliers, then the problem is represented by their ability to adapt to a market that asks, at decreasing cost, quality services and the ability to manage integrated services.

This adjustment necessarily require higher-level staff with the ability to coordinate various activities, information systems for planning, control and

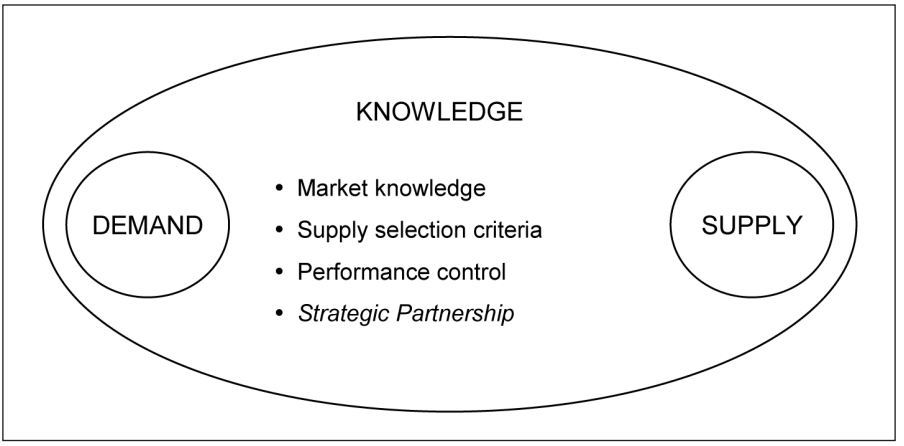


Fig. 1.6 – *The Facility Management model is a partnership relationship between supply and demand*

reporting activities: essentially, as mentioned, a new profession: the Facility Manager.

Ultimately, in our country the "discovery" of the Facility Management takes place in a historical period in which supply and demand, addressing the issue in the wake of pressing needs, engender a misconception that runs the risk of compromising in the short to medium period takeoff of a business that, for its structural characteristics, requires great clarity operators compared to their way of placing on the market and formulate their options and strategies.

According to the most advanced model and strategic Facility Managment the relationship between supply and demand should be structured through a process that will lead to effective partnerships often meant to last.

2 Management models

In general, we can see how the multiplicity of players revolving around the construction sector (property developers, designers, construction companies, maintenance companies, etc.) face late – compared to other areas – the challenges that the management of complex structures, such as buildings, entails. This delay has its justifications, and is reflected in the analogous situation in which there are the patrons of the buildings.

Good part of the players, both on the supply side and from that demand, is still bound to a view of the problem in terms of maintenance (be it plant or construction) and does not grasp the wider dimension linked to the concept of management.

The result of this cultural and organizational inadequacy (which leads to a setting of the fragmentary management) is that the management costs of a building is scattered on different cost centers; this matter often prevents them from having a vision unified and timely on management problem.

In addition, the different activities involved in the management of buildings (building maintenance and installations/furnishings, management and maintenance of traditional systems, security, telephony, EDP and distributed computing, reception, cleaning, etc.) act in an uncoordinated and unplanned manner. The inevitable consequence are: overlap and contradiction in the various interventions, time dilation and user discomfort, uncontrolled increase in costs, difficulty of identifying specific responsibilities for inefficiencies, accelerated obsolescence of the structure.

2.1. Internal management

A good number of companies, in particular those of larger size, manage their important buildings with internal personnel (direct employees), often

with a significant number of people, entrusting to external suppliers of the implementation of more specific operations such as cleaning, maintenance plant engineering, etc.

This office service task, often consisting of a single person, consists in a system of activities referred to as "property management", namely:

- study for the use of the building regulations and procedures in accordance with existing legislation;
- planning costs and expenses;
- management and supervision of suppliers;
- management and supervision of the services provided by internal staff;
- administration of personnel involved in building management.

It must also report to the management on operations and suggests interventions and strategies to optimize these activities.

This organizational model is called "Internal Management".

The negative characteristics of this organizational model are: lack of a vision / global control of management, difficulties of coordinating different activities, hypertrophy of resources.

Moreover, it often happens that the personnel involved in the management processes appears little incentivated, in the execution of their work, because this activity is considered necessary, but with little relevance to the company's success.

We have seen that part of the services in the previous model are entrusted to external suppliers. There are three main ways to organize the outsourcing depending on the number of outsourced services and the number of external suppliers involved.

2.2. Management Agent

The first mode of outsourcing consists in coordinating the office/ service management with an adviser (a consultant) with deep knowledge of the services and real estate management market issues, with the task of leading the process of coordination of external suppliers and management optimization.

In this model, called "Management Agent", services are in part carried out by the personnel (company employees).

This model has no special advantages over the Internal Management model, except for an increase in service quality due to the presence of an expert.

2.3. Management Contractor

The second approach is the outsourcing of all services to various suppliers co-ordinated by a manager with the task to coordinate, administer and supervise the supply of services.

This model, called "Management Contractor", presents an increase of the degree of services outsourcing, resulting in internal staff reduction and increased organizational flexibility.

In addition, this type of outsourcing allows for greater cost control of individual services. The disadvantages resulting from the presence of numerous suppliers, which requires considerable coordination activities.

This model also has the problem of correct attribution of responsibilities/services to various providers, which can cause considerable disruption.

2.4. Total Facility Management (TFM)

The third mode involves the outsourcing of all services to a single supplier and the presence of an in-house supervisor, a position that can be filled by any member of the management team.

This type of outsourcing is defined "Integrated Services" or "Total Facility Management" (TFM) option.

This model theoretically eliminates the problems related to internal management and add up all the benefits seen in previous cases, increasing the quality of services (now held by motivated and well-coordinated), achieving cost savings.

The disadvantage of this approach is represented by the loss of control over the management process and the delivery of services, in particular as regards those of building maintenance. This could lead to significant problems in the case of buildings that host strategic activities such as banking and insurance centers, health care, and similar buildings.

It is therefore necessary the precise reliability of the assets under management and a strict control of the clauses and measures. The standards used in the industry can provide some guidelines to draw inspiration for the drafting of contracts, with a definition of extreme detail for operating procedures[1].

1. Roversi A. (1994), "'Intervention' Measurement of maintenance needs and offer a comparative analysis' conference scheduled maintenance of large real estate portfolios held by IRI Fiera di Milano", Milan, February.

2.5. Global Service

In a growing market it is normal to experience some confusion in terminology. A classic case is, for example, that of the term "Global Service": many people use this term as a synonym for Facility Management.

The Global Service is only a contractual mode, among the several possible, to adjust the Facility Management services.

The peculiarity of a Global Service contract is the fact that the economic return is, at least in part, linked to specific results that the service provider will have to achieve.

The Global Service contract was subject to a UNI (n. 10685 of March 1998) type of guidance entitled: "Criteria for the preparation of a performance-based contract (Global Service)".

Actually the Standard deals specifically with the Global Service contracts in the field of maintenance, but its contents can be easily generalized to the whole of Facility Management services.

In a Global Service contract the client empowers a third party, for a defined period of time, to execute the maintenance of a certain type and number of assets in order to:

- keep them in the state of conservation required;
- obtain their willingness to produce and/or carry out the requested service;
- have proposals for improvements aimed at reducing the cost of the service and/or to increase the technical characteristics of the asset and their availability to deliver services.

The underlying assumption is therefore the capacity, by the client, to define the performance level of the asset object of maintenance. This is obtained only through a careful survey of the state of functionality and quality of the assets in order to identify both the situations that must be subject to periodic actions aimed at maintaining the performance degree required, both those which, as a result of processes of obsolescence or physical degradation, require interventions able to re-establish the expected levels of quality, which must then be maintained over time[2].

At the basis of a contract of Global Service type there are other factors to be underlined:

- the contractor shall operate the well according to the parameters and procedures agreed by contract;

2. Talamo C. (1998), *La manutenzione in edilizia*, Maggioli Editore, Rimini.

– the contractor is responsible for the design choices, planning, management and implementation of the maintenance activities, except as expressly agreed with the client;
– the contractor still guarantees the achievement of all agreed upon results;
– the contractor provides the documentation to allow the customer to have the knowledge of the technical and economic history of the property and assess whether the taker has operated in compliance with the technical specifications and the Global Service contract;
– the payment is at least a portion, based on the results obtained; the measurement results is carried out according to agreed methodologies;
– the contractor will be required to pay a penalty if they do not keep their commitments contractually (do not reach the expected results or deviation of its performance from the results predicted over an agreed threshold).

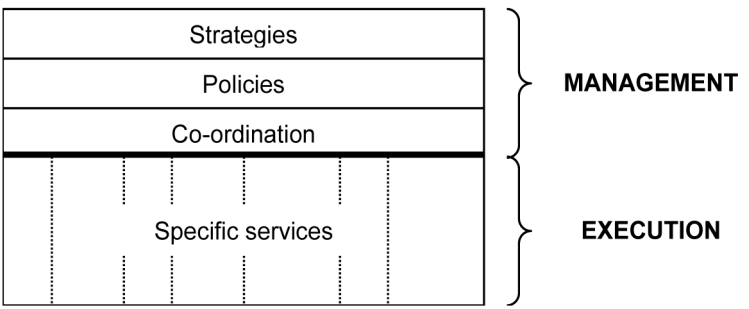


Fig. 2.1 – *One of the possible schematization of services*

3 Services payment and efficiency

3.1. Reasons for outsourcing

The motivations that drive the market towards an outsourcing of auxiliary services (activities necessary to support the core business) are manifold but, in the end, the main goal is saving money, both in the short and medium term. Often it also speaks about a better quality but, at the same level of services, also quality means savings.

However, going to see how we realize the savings, you can mainly find the following several reasons.

1. *Concentration on the core business*: this is the most common phrase and, basically, means trying to avoid efforts and not wasting internal resources in attempts to manage and perform activities that are not part of the know-how and the culture of the company and then outsource these activities relying on specialized operators into the market.
2. *Quality*: as mentioned above, the quality is a concept unrelated to the service level, which can also be different depending on the contractual agreement. Working in quality means "doing things in the right way", professionally and according to a precise pattern that only those whose core business is this kind of services can put into practice, thanks to their know-how and expertise. This means doing right the first time and probably in less time, and at lower cost.
3. *Internal and external synergies*: in the case of reliance on a single supplier for multiple services, the knowledge of the contractor should allow, already under the overall service design, to reduce costs due to the possible synergies between the set of activities, both of executive type, that of the management. The possible synergy of type "external" refer to those achievable by the supplier with other contracts assigned to him, both as regards the activities (the client has to pay a full salary

even if it does not occupy that person at 100%; the supplier can use it for different projects), both as regards purchases (the client only buys itself, while the supplier can buy in better conditions as the sum of the volumes more customers).

4. *Contractual Certainty*: it is intuitive that it is much easier and achievable for the client to enforce contract terms (both in terms of cost and service provided) rather than control a budget and internal procedures.
5. *Efficiency*: if the contract is clearly stipulated (see above), the supplier is forced to make its structure more efficient, to avoid penalties or even fail.
6. *Technology*: the suppliers, to improve their efficiency and survive in the market, must constantly update their operating technology as a function of available innovations. This is clearly an attitude that the client reserves to its core business and not the other activities.
7. *Flexibility*: even taking the concept of "external synergy," is much easier for the supplier to adjust its operational organization of a contract for other requirements than for the client. Moreover, very often, the client managing and running the in-house support services, has some difficulty in reconciling the contract of the employers to its core business with the operational requirements of such services.
8. *Transfer of responsibility*: the legislation, also in the field we are discussing here, is becoming more specific and full of obligations; and is the same law that allows to transfer many of these obligations to third parties, with extreme relief by the client.
9. *Cost reduction*: as already mentioned, it is the main reason which includes all those so far exposed. The reduction of costs, increasingly speaking with the same level of service, is normally possible in the short term; that is, the sum of the costs incurred by the client for the management and execution of services before entrusting an "integrated multi-service contract" should be higher than the cost of the contract thanks to the implementation of the individual reasons explained above.
   A further part of the cost reduction is normally seen later (in the medium term) and covers all those indirect costs that can not be transferred immediately in the contract. In terms of examples we can consider the client's purchasing department, made up of an old and three younger employees. After the signing of the "integrated multiservice" contract, the suppliers were reduced by 50% and the volume of purchases (without the value of the contract) dropped by 25%. Probably when the elderly will retire will not be replaced.
   Generally other reasons are involved in the cases in which, together with the contract, even the operators are transferred from the client to the supplier, in this case this is outsourcing.

10. *Reduction of personnel*: the reduction is often not only formal (the same number of people passing by client's employee to supplier's employee), but substantial, since it is very common that if, for example, 100 units performed certain activities are transferred, the supplier is committed within a certain time to use 80 of them to perform the same activities, with significant savings. It is clear that the supplier is applying his experience and know-how, which also includes the specific training of the employees in question. In addition, as mentioned above, 20 units do not disappear, but they will be diverted by the supplier to other contracts.
11. *Motivation of staff moved*: the motivation of the transferred staff is critical to realize the reduction above. As well as all that the supplier can do (welcome in the new company, training, etc.), that is essentially based on the concept that, while the staff moved once was employed in "no core" activity that is usually accompanied by poor attention by the company; on the contrary, the supplier involves the transferred staff in operations that are the core business and that could mean career opportunities, adequate training and everything connected to this new status.

Before summarizing the added value given by a framework contract for the "integrated services", it must be noted that it must have three basic characteristics:

1. unique (qualified) Supplier: allowing the provider itself to have a global vision of the service and the ability to leverage all possible synergies;
2. win/win partnership: which means boosting transparency between client and supplier and that both work towards a common goal;
3. long-term relationship: that allows the definition of continuous improvement plans in the Total Quality Management view.

So, summing up, this kind of contract can provide:

– a greater likelihood of implementation of the programs to cut customer costs due to contractual obligations, and support in the management of a possible broader customer change plan;
– an improvement of processes, due to the fact that the supplier is in the core business and is forced to deal daily with the market;
– a possible reduction in direct costs by the supplier, because of his experience, knowledge, negotiating power in purchasing and, intuitively, the interruption of "bad" habits in existing client processes;
– a contraction of indirect costs for the automatic reduction of the number of suppliers – in particular, in the case of transfer of personnel,

other indirect costs can be reduced since it is directly linked (eg. HR department, payroll office, spaces, etc.);
– greater operational flexibility, due to the type of the specific organization model of the supplier (and still more remarkable in the case of transfer of personnel);
– increased reliability of the client's budget, due to contractual obligations of the supplier.

3.2. Types of contract

Until the recent past the client was leading the contractual approach; after having provided the necessary activities considered, merely requested the supplier a balance concerning labor hours and a list of materials.

Recently the concept has essentially overturned: the client is no longer interested in how the supplier intends to fulfill the contractual tasks, but is brought to assess primarily the final result. It must be said that this approach has seen some negative experiences and brought the customer not only to request and to measure certain outcomes, but also to determine contractually guarantees and explanations to enable him to be reasonably sure that such results will be achieved.

The main contractual schemes and its methods for calculating the fees are explained below.

3.2.1. Time and materials

This method is the most simple and traditional, is to calculate the volumes of work (hours) for an hourly cost and the amount of materials, referring to a list price. It requires a strong control by the client; in the supplier it produces a poor attitude to efficiency and, in general, does not provide specific performance objectives.

3.2.2. Contract based on units

This is a small change compared with the previous types, in fact a share of risk passes from client to supplier. For example, in the case in which there are 100 square meters to be cleaned, the cost to the client depends on the cleaning service worker speed (for 5 hours of work, the cost is for 5 h based on €/h agreed), and then the risk is all on the side of

the client. With the time and materials the price is, for example, agreed per square meter, then the economic risk is reversed by the provider; the risk of room's unavailability remains with the client, if the cleaner will spend too much time to perform the work.

In addition to this, the method does not actually pushes the supplier to the search for ever greater efficiency and quality and, in any case, any improvement would result in only advantage of the supplier.

3.2.3. Forfait

This method, similar to the above, is not reported to a unit to be counted, but the entire activity as a whole. Always using the example of the cleaning service, the cost of the contract is no longer related to how many square meters have been cleaned, but the supplier agrees to clean the entire building for a total agreed price.

3.2.4. Cost + fee

The method is to highlight and charge the client the costs incurred plus a margin previously agreed. The pure use of this method, if one part introduces the concept of openness, certainly does not push the supplier to take efficiency: more cost claims more, ever, realizes a gain. We need to consider that some of the Facility Management contracts currently in progress in Italy, imported by corporations that have adopted the complete outsourcing solution of the non-core services, have adopted this contractual solution because of its transparency (costs are managed in a way also called "open book").

3.2.5. Global Service

This is the method that, in theory, offers the best guarantees to the customer because the amount can vary depending on the achieved result (a kind of bonus/malus insurance policies). In fact, if the results are less than the contractual expectations, the fee payable by clients decreases as a function of a "formula" contractually agreed; if the results are higher, than the fee will be higher than the base. This does not penalize the clients in the event of worst results, but also rewards supplier in search of better quality and efficiency. The problem with this method is that it is often difficult to identify the parameters and their measurement.

3.2.6. Performance fee

For many people this method is only the english translation of the previous, actually is a specific method for those who carry on Facility Management in the original sense explained earlier. The subject entitled to take care only of the management of services and not their execution can undertake not to receive any compensation for the work, but its profit will be produced as part of the savings that will be able to make on the client's costs.

3.2.7. Fixed maximum price

The guaranteed price is represented by the current costs plus a margin secured to the supplier/operator. This model is applicable when tracked costs in history are known and the knowledge shared. In some cases is possible to share any saving compared to the expenditure budget.

Almost all the methods listed above are normally accompanied by corrective that have the purpose to reduce the related risks. Often can be found in the same contract different methods for different tasks or even complex methods than those formats mentioned above.

3.3. Implementation process

A project that concerns the outsourcing of all, or most, of the auxiliary services of a company is to have a major impact, even on the core activities.

In order to minimize the physiological issues involved in all processes of change it is crucial paying particular attention to the process defined as the "transition period". There are different sub-processes overlapping each other in it (Fig. 3.1).

These processes can be summarized in:

– internal provisions;
– joint preparation;
– familiarization.

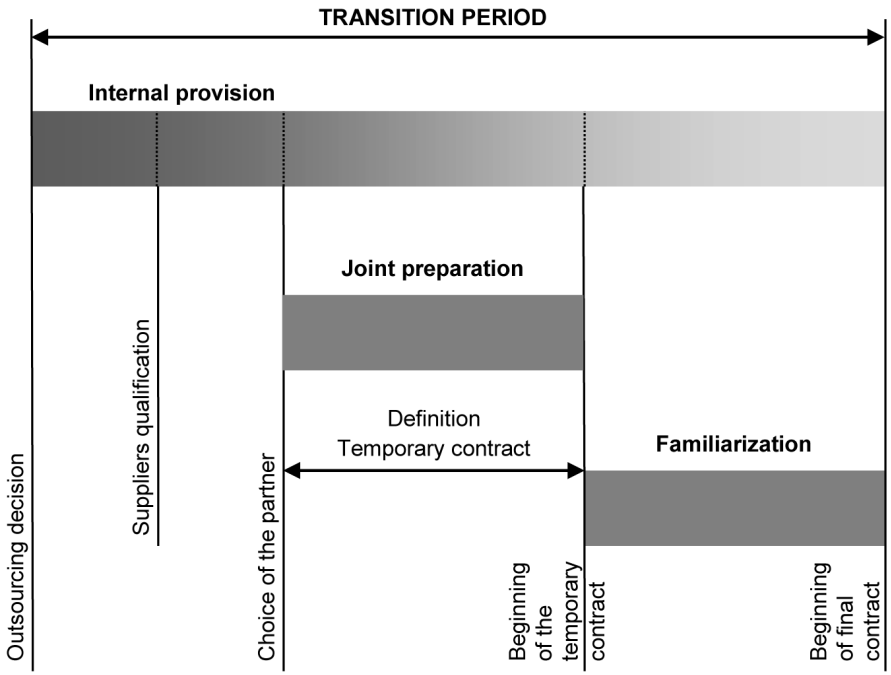


Fig. 3.1 – *Synthetic scheme of the implementation process*

3.3.1. Internal

The internal predisposition involves the reorganization, reports and any negotiations (i.e. with trade unions) conducted exclusively by the client. It begins essentially at the time of decision and proceeds up to the end of the familiarization period and beyond.

This phase also includes the process of choosing the external partner for the realization of the transaction period. In fact, given the necessary transparency to the success of the operation, it is extremely advisable to carry out a pre-qualification of potential suppliers to choose the partner in the process. The basic qualifications to be analyzed are mainly:

– technical and managerial capacity;
– financial capacity;
– contractual objectives that are part of the corporate mission.

3.3.2. Client + partner

The joint reporting process between the client and the partner just starts when the client chooses and engages with partners to implement the transaction outsourcing and ends, ideally, with the beginning of the phase of "familiarization." In this phase the client and his partners will be engaged mainly in the definition of the transitional agreement that the customer will entrust to partners for its needs, in terms of services, during the familiarization period. In fact, this contract will be referred to the whole contractual period, but may be modified, on defined topics, following the experience gained by all the players involved during the familiarization period.

3.3.3. Start up

In the start-up period (generally from 2 to 12 months depending on the complexity) all the programs defined during the phase of joint preparation will be implemented and will be defined in the final contract.

4 The need of a correct setting

4.1. Three level of activity within Facility Management

Based on these premises, it is clear that not necessarily outsourcing is the right solution to solve customer's problems, or in the contractual formula such as Total Facility Management, which involves a total outsourcing services to the Facility Management provider.

In fact, the facility management contract must "reflect" so as objectively as possible the needs of the client and its strategic plan, supporting gradually the appropriate organizational changes.

According to this model the Facility Management department could be represented on three levels as described in Fig. 4.1.

The first level of activity is expressed through the development of an objective knowledge of the problem set, of the characteristics and needs of the client, realized through auditing and benchmarking activities; the second phase involves the drafting of a real "technical and economic feasibility project" of Facility Management services and, same time, the definition of the most suitable type of contract. This activity, if properly implemented, allows sharing strategic goals of service between client company and supplier.

At this stage we will specify the objectives of the services (Service Level Agreement - SLA) and mode-criteria for their control and measurement (Key Performance Indicators - KPI).

The feasibility design phase should include the review of the procedures for granting criteria of services, the possibility of implementation of the services in place or the development of new services. The criteria and the reporting format will be included also as well as the method of payment that will be at least in part, linked to the performance achieved by the provider (Key Performance Indicators - KPI).

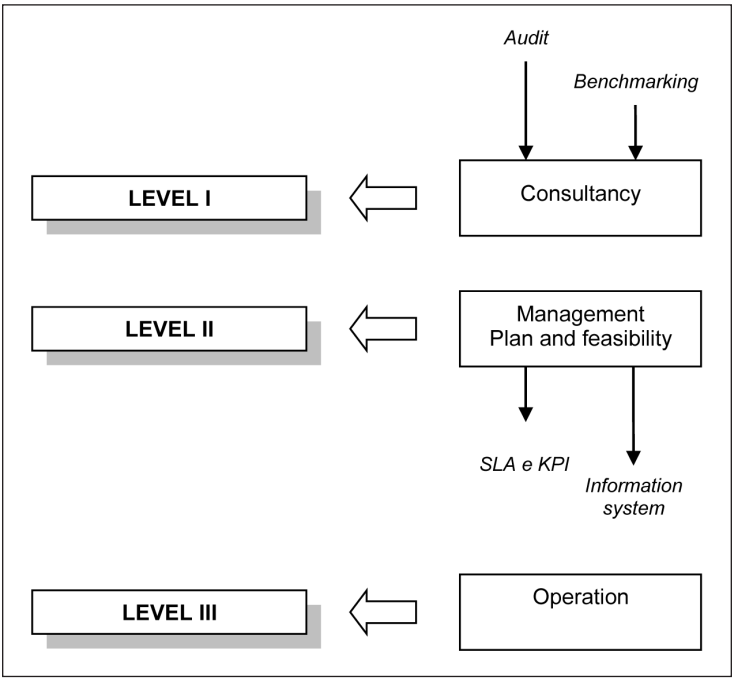


Fig. 4.1 – *Three levels of facility managemend business*

The supplier shall ensure the transparency of its service delivery processes through an adequate system of procedures and through an innovative information system, which will allow the real-time control by the customer of the partner-supplier.

The third level of Facility Management is the real "start-up" of the job.

4.2. Facility Management: a strategy that needs to be designed

According to the most advanced cultural and scientific setting, the Facility Management is, therefore, a strategy to design and subsequently to be agreed in detail, the technical, economic, organizational and contractual implications, between the client and the enterprise management of the supplier; the strategy needs to be properly communicated and managed within the organization of client, involving staff touched by the process of outsourced services. The staff will have to be involved in a training

process, to make it suitable to the new tasks of supplier management and especially in the control activity (Fig. 4.2).

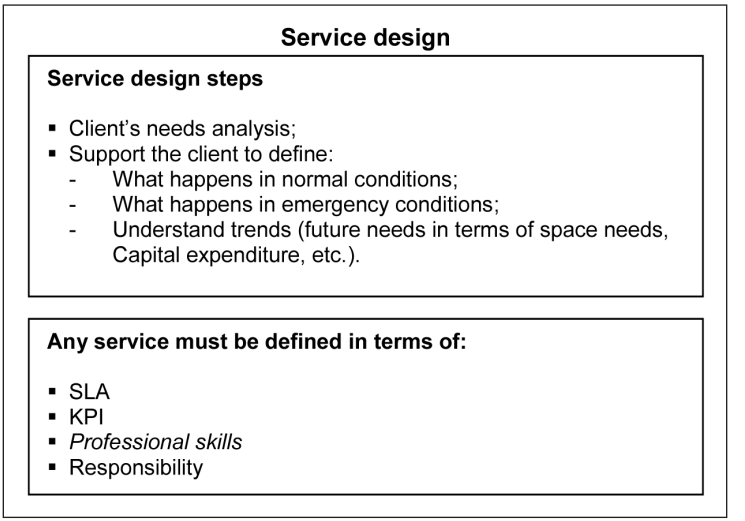


Fig. 4.2 – *Service design phase*

Only wise planning, discussion and involvement of management in the new strategy will ensure the positive outcome of the Facility Management agreement and achieve significant results in terms of efficiency and effectiveness of services and, where possible, a reduction of the related costs (Fig. 4.3).

In this regard it should be noted that the Facility Management is not primarily a way to reduce costs, but rather a complex process for defining and controlling the quality of the no-core services, and only where possible, obtain cost savings (Fig. 4.4).

Any savings, however, may be obtained in the early years of adoption facility management, thanks to the transformation of the direct internal costs in external variable costs, but over time these will certainly not be repeated.

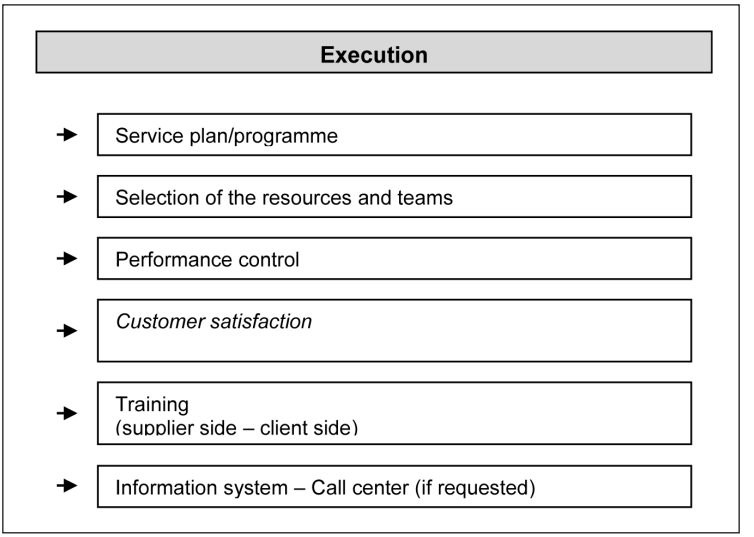


Fig. 4.3 – *Execution phase*

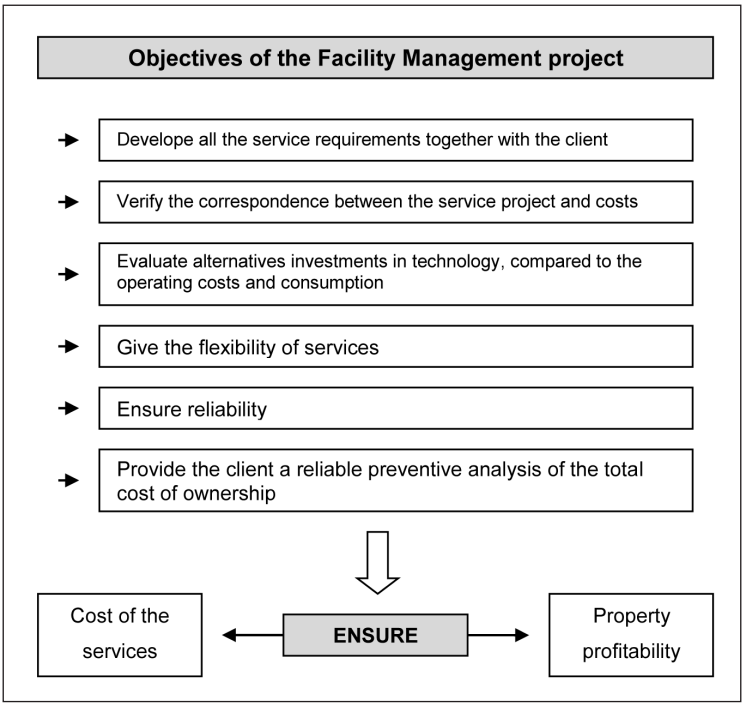


Fig. 4.4 – *Facility Management project main objectives*

4.3. Facility Management added value: organization, information, know how

The added value of the Facility Management is essentially a new dimension and importance for the organization, on the side of the supplier's services organization, which joins the client to support and resolve any issues regarding the services needs. This value should come from the coordination and management capacity of suppliers-partners and a higher motivation and professional quality of the resources involved.

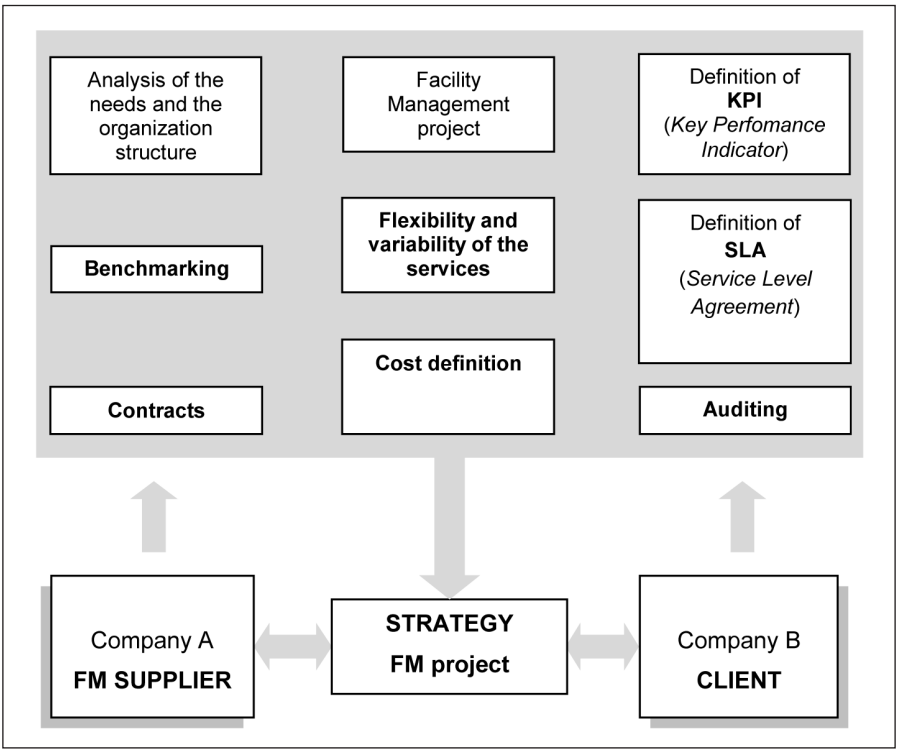


Fig. 4.5 – *Facility Management: a strategic approach*

The Facility Management added value is, and perhaps above all, in its ability to increase the information and then knowledge about the processes involved and the results obtained.

The Facility Management in its most advanced dimension is the shift from "doing" in the systematic management of information, which are

cause and effect of "doing". A systematic management of the information that needs to rise to a higher level of process knowledge and that is the essence, the core of the Facility Management.

In the proposed interpretation Facilities Management is a complex strategy, which must be thoroughly planned and agreed between client and supplier and then expertly handled within the organizational structure and resources of the company that intends to use Facility Management services.

The Facility Management is a well developed and structured scientific-mind system that, to achieve good results, necessarily involves a formalized, sophisticated approach, which can not be addressed simplistically and does not allow shortcuts. The Facility Management is, therefore, a focal point to allow companies to achieve significant organizational simplification and then, simultaneously, increased operational elasticity, which allows to develop and adapt their spaces/work activities in an easy and quick.

4.4. The field of application of Facility Management

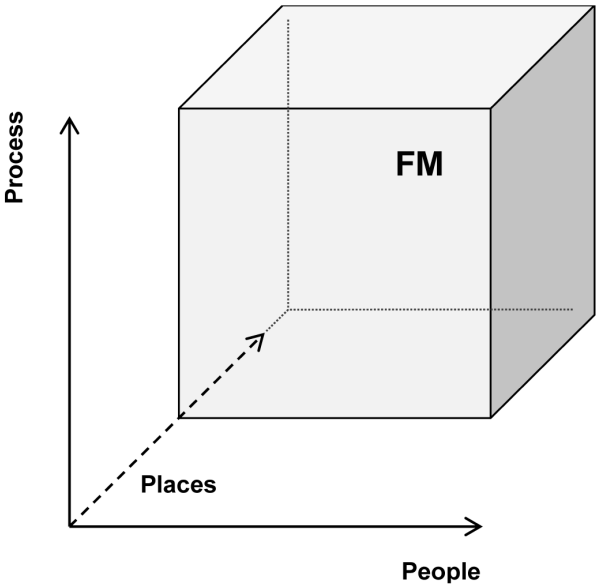
The application field of Facility Management is very wide. Today, many of which use Facility Management services are still debating on the same traditional division between core and non-core services.

According to an approach that is spreading recently in the US, is necessary to overcome the traditional barriers of no-core services because the Facility Management can, and in the future will have more and more, take care of innovative and complex services, that companies focused on their strategic activities cannot develop in company with adequate preparation and quality.

In fact, according to this setting, the Facility Management can expand its scope of business to core services, because the constitutive core of Facility Management is represented by three basic elements:

- resources (people);
- the places / work spaces, with the inevitable consequences in terms of im-plants and technologies in a continuous and rapid development / evolution (places);
- the processes, defined as ability to structure any activity carried out systematically in an organized and controlled "rational and organized system" (process).

It is evident that, if the Facility Management is concerned with those that are indicated in Fig. 4.6 as "The three P", its application should not necessarily be limited only to the area of the no core services.



Source: Felder L.I. (1997), "Euro Facility Management Conference Exhibition"

Fig. 4.6 – *The three dimensions of Facility Management*

5 How to chose the management model

It is evident that the set of activities of a company is the more efficient the more the level of services is tailored to the needs of production, whether tangible or intangible.

In recent years, due to the increased complexity of technological systems, the new demand of productivity, quality and flexibility expressed by the companies, the stronger security research and environmental protection in the works and services, the increasing importance of economic aspect consists of the maintenance costs, have led to an increased focus on the service activity in its various forms, as we have said previously, it has become an essential component for the performance of the core business.

The trend, then, impacting the biggest industries and gradually even the smaller ones opting for outsourcing of services, can be justified taking into account of the reasons described above.

5.1. Service's outsourcing process

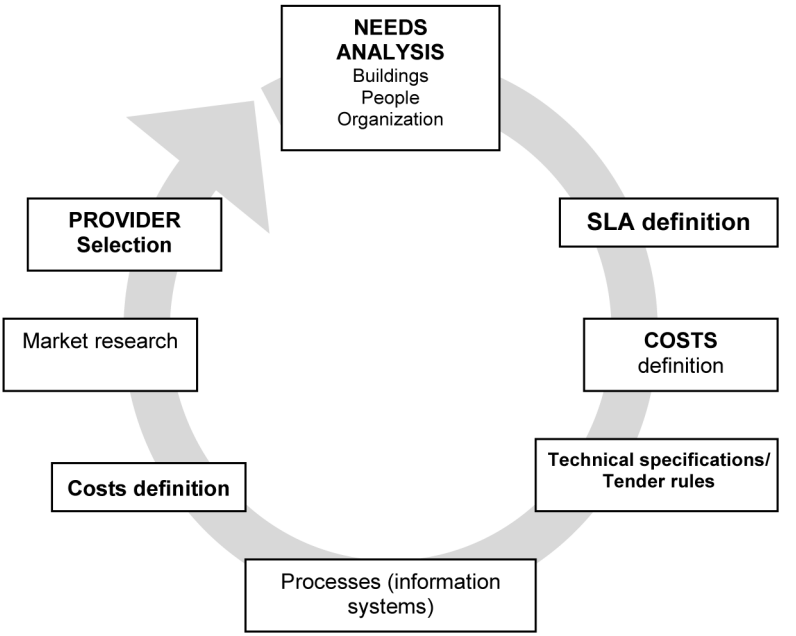


Fig. 5.1 – *The process of outsourcing. The most critical steps are generally represented by the analysis of needs and the correct identification of service quality levels*

The services outsourcing process consists of the steps described below.

Decision Making:
- analysis of domestic demand, which is done through management decisions, internal audit or benchmarking of companies operating in your industry;
- identification of the "basket" of services, to distinguish between "basic" and "advanced" services;
- budget definition;
- outsourcing model definition.

Technical phase:
- service level agreement (SLA);
- development of technical specifications;
- development of tender specifications.

Procedures:
– internal resources or responsible competence centers;
– interaction procedures with the supplier (information flows);
– procedures for interaction with internal users (information flows);
– procedures for carrying out the service control.

Vendor selection:
– preparation of documents for the tender;
– drafting of the contract;
– management of the tender;
– economical and technical analysis of the tenders;
– vendor selection;
– contractualisation of the supplier.

The outsourcing of services can be implemented in different ways in relation to the resources employed, the supplier selection mode, the level of management, and process control. In particular it can take place through:

– outsourcing of services to individual suppliers managed by a single internal function;
– outsourcing of services, organized by macro areas, multi-service providers and managed by centers of competence;
– outsourcing of services to a single supplier with an internal management;
– outsourced services and management to a Total Facility Management Company.

This chapter describes the features of the main models arranged in a scale of complexity corresponding to an increasing level of outsourcing of services and then of the supplier management and delivery processes.

For each business model are indicated:

– the definition;
– dedicated internal resources, the tasks, roles and responsibilities of the figures or the centers of competence;
– the supplier, that is, the characteristics of the market supply capable of meeting the specific requirements;
– the type of contract mainly adopted;
– the elements of success;
– the critical factors.

The goal is to provide the client of references to assess the applicability of the management model describing the needs of their business.

It is important to point out, in fact, as there is not a more functional model of another, but there is, for each company, an optimized model on their specific needs.

5.2. Outsourcing of a single service managed by an internal function

5.2.1. Model definition and application

This model provides the grant of services to individual specialised suppliers, with a 1:1 service / supplier relationship.

The model is applied to companies that outsource a limited number of services, not more than 10, mainly basic and easily re-perishable in the market. The objective is to externalise basic services needing a medium quality level.

This model has been adopted principally by local businesses with one or two sites located in the same regional area, a number of employees below 200 and whose main activity does not require highly specialized services (where they are present, they were held directly by the company).

5.2.2. Devoted internal resources

The decision step is the identification of the necessary services and in the definition of the budget; it is carried out by the owner or by the managing director with the support of other managers.

The technical phase involves the preparation of the specifications and sometimes is delegated to the suppliers who are called to translate the needs expressed by the client during the technical inspection in a document, the RFQ (Request for Quotations), in which the activities and the frequencies are indicated and need to be priced.

Generally in the template they do not formalized the specific procedures and relations between the parties are managed during the activity. The selection of suppliers is based on fiduciary relationship or through indirect comparison of other offers (benchmarking). The decisive criterion in the evaluation of preventive-offers, within the quality/price ratio, is the cost.

5.2.3. The typical supplier

In this model the typical provider is a local company specialized in providing a unique service, characterized by a light organization and a high willingness to satisfy the needs of the customer.

5.2.4. Contract

The types of contract mainly adopted are: lump sum for ordinary activities foreseen in the contract (planned activities) and time and materials for extraordinary activites (not planned).

5.2.5. Key success factors

The main reasons for the success of the model are: simple outsourcing process, ruled by the few resources with broad decision-making powers; the high capacity to react to a problem or new requirements; the intention to establish a trust relationship with the suppliers.

5.2.6. Some critical aspects

The main critical factors are: low expectations on service quality, as consequence of a choice of providers based mainly on cost saving; tlack of organizational, managerial and strategic long-term vision; a minor technical control capability on activities carried out by suppliers.

5.3. Outsourcing of clusters of services, managed by different internal functions

5.3.1. Model definition and application

This model provides the services organized for areas and involve individual suppliers or Global Service specialist. The model is applied to companies that outsource a large number of services (we could say more than 10); it is mainly on basic services, with some advanced services added. The objective is to outsource the services maintaining direct operational control with quality levels tailored according to specific needs.

Usually the typical client adopting such a model is a large or multinational company with different locations around the country and a number of employees (exceeds 500).

5.3.2. Devoted internal resources

The company's organizational structure provides the definition of areas of expertise (personal services, technical services, safety & security, etc.); each is managed by a single point of contact with decision-making and service control powers. The manager has helped in controlling of service from the heads of the various offices.

This figure is also involved in drafting the specifications and the service quality levels, that can be standard for all sites or customized for each site.

Operating procedures and the contractual format, however, are provided centrally from the corporate scale.

The point of contact implements the management strategy by choosing among different models of outsourcing:

– assigning each service to single local suppliers;
– assigning each service to a single supplier on a national scale;
– assigning all the services of the same site to a local Global Service provider.

The vendor selection is done through tendering procedures or by direct comparison.

The criterion used in the selection of the supplier is the best economic offer, after an analysis of the sustainability of the technical proposal; it consists in assessing the vendor's actual ability to comply the contract and the levels of service at the costs defined within the contract.

5.3.3. The typical supplier

In connection with the outsourcing model applied, the supplier could be: a company specialized in the provision of a single service locally, or in a company specialized in providing a single service nationwide, or in a local Global Service provider.

5.3.4. Contract

In the case of local provider, the contracts are lump sum type for planned activites, time and materials for not planned activities; in case of Global Service the contract will be a lump sum plus a variable fee linked to the results.

5.3.5. Key success factors

The success of the model is based on: the strong presence on outsourcing processes and regular inspection during service delivery, guaranteed by the figure of the contact person who has the technical knowledge and management autonomy; the optimization of the quality/price of the services, thanks to the presence within the company of technical knowledge, specific regulations and a transparent providers' selection process.

5.3.6. Some critical aspects

The main critical factors are: the possible inhomogeneity in the management and performance between different areas of services; possible conflicts or overlapping between the representatives of various service areas and the managers of each site; the inapplicability in the local context of the procedures or contractual clauses indicated by the corporate level.

5.4. Outsourcing of services to a single supplier managed by a single devoted function

5.4.1. Model definition and application

This model provides the grant of services to a single subject, usually represented by a temporary association of companies, by cooperative society, or by a multi-service; that means several companies organized in groups, with a leading company.

The model is applied to companies outsourcing a limited number of services. The objective is to externalise all the necessary services that require a medium quality level.

The typical customer adopting such a model is a local situation with sites located in the same regional area, a number of employees below 500 and the main activity that does not require highly specialized services.

5.4.2. Devoted internal resources

Possible subjects in charge to manage the process of outsourcing and service management are the Facility Manager, the technical area (technical

office or engineering) or general services office. They identify the necessary services and their order of importance in the decision-making step, and evaluate the budget.

The technical specifications are drawn up directly or developed with the supplier. Generally in this model only basic procedures are formalized, and specific or special requirements are handled during the activity.

The vendor selection is done through tendering procedures or direct comparison. The decisive criterion in the evaluation of preventive-offers, within the quality/price ratio, is the cost.

5.4.3. The typical supplier

In this model the typical supplier is a Temporary association of companies: a cooperative system, or a local multi-service company.

5.4.4. Contract

The contracts are lump sum type for planned activites, time and materials for not planned activities.

5.4.5. Key success factors

The main success elements of the model are: a lightweight oursourcing process, ruled by dedicated resources with adequate technical knowledge and decision-making power; the presence of a single contractual interface; the simplification of the management and coordination of suppliers; the ability to perform a technical inspection on the work of suppliers.

5.4.6. Critical aspects

The main critical factors are: the possible lack of homogeneity of the services quality, due to the presence of different suppliers not aligned in operational and procedural terms; the low expectations in terms of services' quality levels, stemming from a choice of provider based mainly on cost saving; the lack of organizational and managerial vision for long-term strategy.

5.5. Total outsourcing to a facility management company

This model involves the outsourcing of all services to a single subject, a Facility Management Company, which is set up as sole contractual partner in the double role of integrator and services provider to the client; the main activities are: supplier coordination, monitoring of service delivery, measurement of the services provided. The Facility Management company subcontracts the provision of services to partners (specialized suppliers), while directly carries out the management activity. The model is applied to large groups or corporations in which the provision of services is characterized by a very high level of complexity due to the size of the sites and their spread throughout the country; to the high number of services and the presence of advanced services (high technology, high quality, etc.); to the high degree of relations and procedures, both supplier side, both end-user side; above all the specific willingness to outsource also the management component means high expectations.

5.6. Internal resources

Possible subjects in charge to manage the process of outsourcing and manage business and operational relationships with facility management companies are: the corporate Facility Manager, the technical area (Technical office or Engineering) or Purhcasing office. They handle both the "decision making", defining the outsourcing strategy and goals in terms of cost and finding the expected service level, both the "technical phase", elaborating the specifications, the service levels agreement (SLA), reporting and draft contracts, often suggested at corporate level.

The vendor selection is done through tender procedures, often entrusted to other companies specializing in the management of services procurement. The vendor selection takes place according to multi-criteria analysis, pondering, in relation to the information and customer needs: the cost rationalization while preserving the technical sustainability, raising and maintaining the levels of time quality expected; the optimization of supplier performance; the development and/or integration of operational procedures; the realization or implementation of information systems and reporting tailored to customer needs.

5.6.1. The typical supplier

The typical supplier is a Facility Management company operating nationally and internationally.

5.6.2. Contract

The types of contract are mainly lump sum for ordinary activities and time and materials for not planned activities/services. In this model is often also applied to the contract "cost plus fee": in this case it is expected to be declared the costs of individual subcontractors (cost) and the percentage of remuneration (fee) by the management for each of them.

5.6.3. Key success factors

The main reason for the success of this model are: the presence of a single contractual referent as operational interface; the total or partial outsourcing of the management; the ability to develop an organizational-management strategy in the long term; the effective rationalization of the supplier base; a real opportunity to reduce costs; managerial uniformity resulting from the use of specifications, service level agreement, procedures and standard contracts.

5.6.4. Critical aspects

The main critical factors are: the ability to successfully apply the model only in situations with a certain degree of complexity and with a certain volume of managed services; the non-obviousness of the pure management costs in the case of lump sum remuneration; the loss of internal expertise on the management and control of services.

5.7. Conclusions

On the basis of what already seen and in relation to the observed experiences, it can be determined the most relevant issues and identify some key success factors in the management of the process of facility management services outsourcing:

- a proper identification of needs and characteristics of the services which may be subject to outsourcing;
- the availability of information properly formalized on the buildings that host the business activities;
- the setting of a direct internal audit process to cordon off the services that can be outsourced to third parties, their content, the sustainable cost (direct delivery costs and indirect costs of management/ coordination);
- determining the level of outsourcing of activities/services and, consequently, of the applicable management model: in a nutshell, the decision should relate to the maintenance of the role of government/ coordination within the company or its outsourcing;
- the attribution of specific responsibilities within the company: regardless of the adopted management model, the concession of the service delivery system to a third party must always provide an internal reference that represents the client and need tyo have an adequate level of autonomy;
- the direct participation in the activity of the service design: only an active involvement by the client can lead to the definition of service standards, related to the real needs of the company and to the application of effective monitoring systems;
- setting up a monitoring/verification system constantly during the contract, without which the quality level of any benefits/services tends to decay.

6 The Facility Management audit

6.1. Facility management audit structure

After evaluating the service requirements in terms of measurable quality, as we saw in the previous chapter, in relation to the "weight" of the service or activity on company budget, it becomes essential to carry out an analysis of the service management model in use within company.

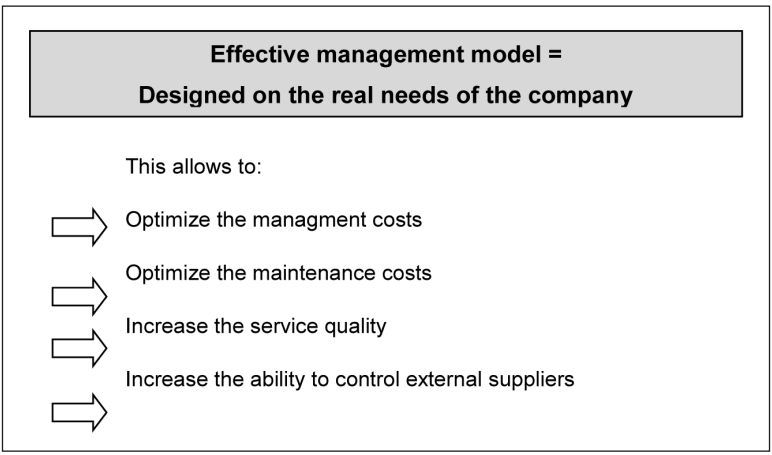


Fig. 6.1 – *The advantages of an effective management models*

The goal of this analysis is, therefore, to verify the efficiency of the model in relation to the characteristics and needs of the company, through the check of all the factors, tangible and intangible, involved in the process.

May be easy to understand what happens if the service is not working, or its quality (the so-called "what-if"), because of the direct effect on

production activity and final budget; while the indirect effects that the poor quality of a service may generate are not always easy to measure.

An example of indirect fallout efficiency of a service on the property of the company is that concerning the services to the buildings: the quality of such services, in fact, allows not only to maintain the viability and practicability of building conditions, responding to environmental requirements, but also to preserve their value.

The internal audit methodology is a first qualitative evaluation tool of the services model management, which aims to bring out the strengths, any critical issues and possible areas for improvement of the management model in use in 'company'.

The basic stages of the audit process are:

- the identification of services, managed and coordinated, according to the themes proposed in the first chapter: services for business, people and building;
- the identification of the function or department leading the service management, aimed at verifying whether the internal resources and their skills are sufficient to manage the use of the services process;
- the analysis of the service execution model, to examine whether the model is sufficient to guarantee the expected quality of services;
- the analysis of service management procedures, to examine whether there are opportunities to reduce operating costs and improve service quality through better management of suppliers, resources and processes;
- the processing information and definition of the strengths and any critical issues and possible areas for technical, economic and organizational improvement.

Given the importance and complexity of the audit, some basic steps will be described in the following pages; this activity represents a real consultancy, aimed at companies that want to streamline and improve their performance in service management. These activities are generally carried out by consulting firms, facility management companies and university departments that conduct research and training programs in the field of property management.

The outcome of an audit program can be some suggestions about: the ability to increase the performance of some functions in the company; the guidelines for the restructuring of business management processes; the improvement in the use of resources through better management programs.

6.1.1. Service identification

In order to build the overall picture of the service management process that the company operates, the first step consists in their identification and classification to be carried out with respect to:

– service to business, people, buildings;
– resources or competence centers in charge to coordinate services.

This step will make it immediately clear that not always services classified in the same subject area are managed, within the company, or by the same figures by the same function (or center of competence). As already mentioned in previous chapters, this can happen because some services have a greater weight on the business or on the balance sheet, so the company could decide to assign the management of these specific services to different functions.

It is, for example, the case of some small-medium-sized enterprises in which it is often the administrator or owner who directly take care of the services that have more impact on the company core business, removing them from the ordinary activities delegated to other roles.

Similarly, in the case of large international corporations, it may happen that certain services considered hard are managed directly from corporate or external centers of expertise, making use of unique suppliers for all offices located in different countries within the branch office and appointing a single point of contact with control tasks.

6.1.2. Responsible for the service management function

The analysis of the corporate function responsible for service management is performed by identifying:

– the resources committed;
– their tasks and responsibilities;
– the profile of the person responsible.

The identification of the figures involved in the coordination of services is essential to streamline the analysis of the process, since it allows you to check whether the delivery of a given service is directly controlled by a function or a center of competence and, therefore, of identify who has the responsibility.

First it is needed to make a distinction between the resources employed at management level, that may be within the company or free lance and/or consultants.

Tab. 6.1 – *Example of functions with management responsibility*

Resources	
internal	*external*
CEO Area manager Department head Head of production	General contractor External competence centers (corporate) Consultants

Internal resources which are usually entrusted the management functions are: CEO, area manager, department/function head, head of production.

Among the external resources: general contractor, competence center (i.e. real estate devoted staff, in the case of corporate), consultants and advisors.

The profile of the person in charge of the process management must be carefully analyzed in order to assess if his knowledge and skills are relevant with respect to the efficiency targets assigned by the CEO.

Typically the tasks of the departments responsible for the services management are:

Study and updating the regulations and the procedures for complying with all legal obligations (especially the service activities related to maintenance);

- cost planning;
- selection and coordination of external suppliers;
- administration of internal staff involved in the delivery of services;
- quality control of services provided.

6.2. Service delivery model analysis

The services can be provided according to three models in which the discriminating factor is the relationship between the company "client" and staff providing the services.

These models are:

- inhouse: personnel providing the services is employee by the company to which the service is performed;
- outsourcing: the personnel providing the services is an employee of a service company (supplier);
- mixed: the personnel providing the services is partly employee by the company to which the service is provided, in part is an employee of a company whose business is the provision of services.

In the next chapter is presented how, each business model is successfully applicable also in relation to the services delivery model in use. It may happen that the adoption of a more advanced management model put the change of services delivery as a constraint; for example, a detectable trend in the market sees the passage of non-core functions to be inhouse (internal employees) to outsourcers (supplier).

6.2.1. Service management procedures

The service delivery involves on a different level three distinct entities: the company responsible for the service or facility managers, service providers and internal users, i.e. people who use the services directly or indirectly. These figures, in the various stages of the process, are continually called to interface and exchange information or share decisions. To obtain a smooth operation of the entire process is desirable to regulate their relations in accordance with specific procedures.

If the end user represents the internal demand and the supplier is the supply, the Facility Manager is the collector of all processes. The procedures are managed by the Facility Manager, both in the case he is an internal resource or (in the case of outsourcing) he is outside the company.

They differ in relation to the entity that interacts with the Facility Manager as follows:

- procedures on the side of the "internal user": the request for information about the service or its accessibility; ordinary request for service activation; extraordinary request for urgent action; reporting of malfunctions or complaints;
- procedures on the side of the supplier: service activation request; extraordinary request for urgent action; request for information about the delivery of the service (monitoring); requesting information regarding compliance with the service levels (control); consultative spending request (cost control); periodic reports on the progress of the service request (reporting).

Each procedure indicates the authorized entities, the timing, the manner and the means by which the exchange of information should be carried on.

6.3. The relevance of the services to the needs of the company

To evaluate the more effective management model for the specific needs of the company, it is essential to make a preliminary analysis on the characteristics and peculiarities of the services involved.

The first objective of this analysis is to provide the keys to understanding how to assess the strategic choice in outsourcing services or keep them in the internal organization (in-house) and, in relation to this, choose the most appropriate management model.

Define the strategic nature of a service with respect to the core business and choose to keep inhouse or outsource it is a delicate step, which must take into account the specificities of the company in terms of products, production process, available resources, and types of customers.

It is believed by some players that the division between core and no-core activities is a well-marked line, dictated only by the industry sector; in reality the distinction is extremely unstable and changeable in relation to the specific characteristics, conditions and strategies of the company.

As a paradigm of this statement it is possible to bring the example of a company operating in the textile sector: in a phase of a functional reorganization it has made the strategic decision to maintain the internal call center activities. This choice would seem to be contrary to a trend of the market that prefers to outsource this function to companies specialized in this type of service. The reasons for this choice lies in the fact that the company considered the call center the privileged channel of communication with its clients and has considered an investment in terms of product marketing. The company has therefore preferred to provide the service with in-house staff, well informed about product characteristics and loyal to the company itself.

The case tell us how important is to give the right weight and value to the service to be evaluated in terms of opportunities for its core business.

In order to allocate the right weight and value, we must analyze the core business support activities in the following specific interpretations:

– the relevance to the core business;
– the economic influence on the core business.

6.3.1. Relevance of the service to the core business

The relevance to the core business is defined as the level of direct or indirect impact, of a specific service activity in terms of strategic support to the core business.

The relevance in terms of benefits of a single service to the core business is estimated according to three factors.

1. *The impact the activities, in terms of function, on the core business*; it means to evaluate how the failure of a basic service delivery produces a negative effect, even indirectly, on the core business, generating malfunctions in the production flow. For example, a non-adequate maintenance activity to the electrical system (general electric panel, generator, UPS) can generate black-out situations, causing an interruption in production.
2. *The impact of service quality on core business*; this means evaluating how the performance standards of a specific service, basic or advanced, is affecting the production process. For example, within the food businesses or in case of production processes requiring working procedures in sterile environments, the inadequate quality of sanitary service can adversely affect the quality of the product itself.
3. *The impact of the skills required to perform the service, on the core business*; this means to assess the impact on the core business of internal or outsourced resources, required to perform the service. Examples are the resources needed in the advisory/consultancy field, such as quality control, legal assistance, wages and contributions; or the resources needed to perform highly specialized technical services, such as maintenance of production plants and information technology (IT) support.

6.3.2. Economic influence on the core business

The economic importance of the influence of a service on the core business can be evaluated according to different factors.

First, the incidence of the costs on financial statement level, which implies an assessment of the tax benefit in changing a direct costs in indirect costs the budget; for example, a service contract with third parties (outsourcing), generates a cost deductible in terms of taxation.

The incidence of different costs between using an internal resource or outsourced service, which implies an assessment of the benefits in terms of direct costs, indirect (structural) and quality of service. For example, the service "concierge and access control" performed by internal staff provided by a minimum team of three/four full time equivalent (FTE), as they have to turn; moreover, in the cost of these resources should be considered the data about the monetary increase, provided by the National Collective Labour Agreement (CCNL), for night hours or holidays; finally, in case of

illness or holidays, to keep the service is necessary to require overtime to other resources with a further increase in business costs. The same service outsourced ensures fixed costs, as contracted, and service coverage.

The incidence of the risk of outsourcing, entails an assessment of the risk of losing know how and expertise, a decrease in control over the quality of the service, an increase in the bargaining power of the supplier; it must be also considered the risk of an eventual loss of relationship with a supplier. In case of failure, it determines the indirect costs to select a new service provider and, new contracting, familiarization and procedures adaptation.

Another risk is the incidence of cost variability of outsourced services, because they easily change over time.

6.4. Audit and benchmarking: analysis tools

To manage a building must be known the architectural, Real Estate and performance features and in te case of a building belonging to a company, also the organizational problems and the strategical objectives of the owner.

The exact knowledge of the building is the essential condition that makes possible the application of a Facility Management program: an analysis leading to the detection of problems that in most cases the owner is not aware of. In countries with a developed market (USA, England, Germany, Holland, Japan, etc.) this knowledge is reached through audit and benchmark analysis, two methods of analysis and management of information that can be supported by IT tools.

The audit should be used as a process that encourages managers to be assessed in their management activity. It must be structured by means of the adoption of check lists or questionnaires (a sort of operating manual) that are directly used, so as to represent an independent assessment tool, objective, to understand the issues of that particular property management activity or set of activities.

The application of an audit program can provide numerous advantages, among which:

- an increase of the efficiency of the business function;
- guidelines for a new organization of corporate Real Estate management processes;
- improving the use of resources through better management programs[1].

1. Kaiser H.H. (1991), *Maintenance Management Audit: A Step-by-Step Workbook to Better Your Facility's Bottom Line*, R.S. Means Co, Construction Consultants and Publishers, Kingston, Massachusetts, p. 35.

Generally the audit program is structured in two phases. The first concerns the collection and evaluation of preliminary data (*Preliminary Program Review*)[2], the second concerns the analysis and data processing for estimating the effectiveness (*Effectiveness Rating*)[3].

The final results of the analysis can also be used as benchmark to be compared with generally accepted productivity target by other organizations.

The effectiveness estimate (*Effectiveness Rating*) allows management to identify problems and focus the actions needed to achieve significant improvements.

To conduct an audit it must be taken into account that:

- data quality - the audit objectives and its areas of application must be clearly defined to ensure constructive feedback and effectiveness in operations;
- the internal department responsible for carrying out the analysis, must be audited;
- the audit must be objective and constructive - it must be made every effort to ensure that all those who conduct the analysis maintain an independent and constructive view;
- the assessment must be understandable and practicable in the short term.

6.5. Business audit

Phases, degrees and basic functional tasks of the audit process may vary depending on the size, style and organization of the analyzed structure. The following are the main steps.

6.5.1. Step I – Priority definition

1. Definition of the activities for analysis, preparation of a preliminary plan of assessment, prioritization and timing definition.
2. Priority areas for analysis, issue of a work plan.
3. Development by managers of a Steering Committee; definition of priorities in the departments of analysis. The definition of these priorities is to decide whether to revise all functional activities or just some of them.

2. *Ibid.*
3. *Ibid.*

6.5.2. Step II – Audit plan

– Analysis of the functional areas and procedures; Identification of the working team members.
– Collaboration between managers of the departments; sessions on the audit objectives, team's composition and work time.
– Preparation and submission of the questionnaire to the managers of the departments for any additions and/or suggestions.
– Data collection on different areas.
– Preliminary definition of the audit scope: boundaries identification.
– Preparation of the report containing the targets.

Definition of an audit work plan:
– verification of the possible methods of analysis and data collection;
– identification of criteria to be used for performance evaluation;
– determination of necessary coordination procedures;
– identification of tasks;
– estimated resources required to conduct the audit;
– estimated time needed for the analysis run.

In summary these preliminary steps include three key practices:
– the coordinator discusses the proposed audit with the department managers involved in the process;
– the working group proceed in collecting information that will be provided to the audit team;
– definition of audit parameters and processes to be examined.

6.5.3. Step III – Team training

1. Selection of the audit team members and/or organization with the heads of departments regarding the way of involving the employee.
2. Familiarization of the team with the functional areas and the "style of work".
3. Confirmation and adoption of the audit scope.
4. Confirmation of the adoption plan with the department managers.
5. Discussion of the methods and procedures with the work team.
6. Preparation of the detailed tasks through a scheme of functional areas and preparation of the material collected by the staff.
7. Assignment of specific tasks to team members.

The coordinator should select the members of the audit team, provide for a temporary suspension of routine tasks. The team candidates must

represent a snapshot that includes skills from the field of work planning, technical and financial management.

It is also important to have a detailed planning, clearly setting out the timing and the duties of individual members.

6.5.4. Step IV – Audit implementation

1. Data collection. It is accomplished through procedures such as analysis, interviews, questionnaires, review of budget documents. The guideline checklists identify what data to collect.
2. Organisation and analysis. This phase of the work includes records of information from the survey, a synthesis, the organization of data from interviews and, finally, the interpretation of data.
3. Identification of main problems within the organization, related to processes and functions.

The team carries out a work of analysis of the problems that are gradually analyzed through the collection of information.

6.5.5. Step V – Results

1. Suggestions to management support for the solution of problems detected in the survey.
2. Structure and content of the report.
3. Allocation of responsibilities; preparation of initial reports.
4. Discussion, evaluation and review of the preliminary report.
5. Discussion of the revised preliminary reports with the department manager.
6. Preparation of a final report and presentation to management.
7. Review, approval and distribution of the final report.

The success, or tangible results delivery, depends entirely on how the phases V and VI were treated. The main task of the audit team is to provide executives with a report on the degree of positive response to objectives set and emphasize strengths and weaknesses.

The report also provides suggestions for management actions.

6.5.6. Step VI – Management actions

1. Presentation of an action plan according to the team's suggestions.
2. Estimation of team's plan of action by managers.
3. Evaluation and approval of suggestions provided by managers.
4. Managers and supervisors suggestions regarding the phases of the future action plan.

In this phase it is tested and demonstrated the will to effectively manage the organization's resources. The manager answers to the final report issued by the team, proposing an action plan. After assessing the potential effectiveness of the plan (through suggestions and investigations conducted during the meeting), it can be reached an agreement on the precise mode of action. The manager and the supervisor have the task of applying the necessary changes suggested in the reports.

6.5.7. Step VII – Final risults update

1. Monitoring of the implementation process.
2. Presentation to the management of the improvements in the implementation report.
3. Critical review of activities and results (including the evaluation of the project methodology, suggestions for changes in the procedures, etc.).
4. Presentation of a final report to the board of directors and chief executive.

It is clear that the phase VII (efficiency assessment) is a powerful tool for long-term management. To achieve the goals outlined in the plan drawn up by the management, it can take several months or more than a year. It can also happen that the desired results can only be perceptible after a long time. The review cycle ends with a short report with a summary of the results achieved.

6.6. The building audit

The building audit is the identification, analysis and delimitation of the issues and supports the strategy definition (organizational, contractual, economic and technological) to achieve improvements/adjustments to its property management skills, in particular:

– methods and tools used in the management of Real Estate;
– criteria and tools for managing relationships with service providers;
– organizational changes;
– methodological approaches and tools for the planning and control of the budget (costs and activities).

The building audit is usually divided into three phases of work.

1. Data collection is accomplished through interviews specifically to the leaders of the company and to the manager (the interviews are based on a questionnaire divided into specific sections). In this phase should be collected accounting data, contractual, organizational and technical information.
2. Processing of the data collected and definition of problems and critical points within the organization: the analysis and processing results of the data collected will form a map dividing the factors that hinder the economic, organizational and technical development of the management process.
3. Possible solutions planning: it aims to propose hypotheses and feasibility projects for the improvement of the Real Estate management activities, starting from the specific reality of the structure. The "feasibility" structured in accordance with an order of priorities by types:
   – ease in the implementation of the proposed change;
   – the economic importance of achievable results.

The audit activity is carried out by consulting firms, professionals and/ot university departments which have implemented research and training programs under the Facility Management main topic and are able to provide research and advisory service.

7 Designing service quality

To Ensure effective and benefits-generating services for the core business, is necessary an efficient management of resources and useful means for the execution.

The following paragraphs enlightens, through a descriptive form, the factors that must be taken into consideration to understand, structure, purchase and manage properly these services.

The main factors to consider are:

- impact on the core business;
- the tendering documents, i.e. the list of technical and economic documentation required to launch a tender or draw up the service contract;
- the technical data, that is, those data or technical documents that provide information about the object of the service or the delivery method. These data can be used in the process to define the actual needs and quantify the workloads;
- the frequency with which the activities described in the tender are to be carried out;
- indicators of cost, allowing to bring the total cost to a unit cost of a service, comparable with historical data or market benchmark - the cost of a service can be analyzed through different indicators, in relation to the parameter desired to restore that cost; lead back the cost of different services to the same indicator, in fact, makes them comparable to each other in terms of costs and benefits. The analysis of the cost of services through “cost drivers” is therefore very useful to assign a given value to the individual service, both in relation to a specific indicator, both in comparison to other services;
- the level of service or service level agreements (SLA), that is, an average standard of quality of the service level.

In essence, the following pages are aimed to be a support for:

– the definition of the desired service levels (SLA), or the qualitative level-it takes for the service to be effective business support;
– the definition of budget cost, or what you intend to earmark for specific activities in relation to the required standard;
– the decision of the service delivery strategy, i.e. if it is believed to be more strategic the outsourcing of a specific service or its maintenance in-house.

7.1. Services to people

7.1.1. Cleaning/housekeeping

Target	– Ensure an adequate level of environmental hygiene with the intended use of the spaces in compliance with health and hygiene law requirements
Tender documents	– Technical specifications (attività e relative frequenze)
Technical data	– Property floor plans – Sqm for intended use – Sqm for pavement type – Sqm of glass surfaces – Furniture features – Number of bathrooms
Planned frequencies	– Daily / weekly for ordinary activities – Monthly / quarterly / yearly for scheduled activities
Cost driver (planned activities)	– €/sqm (total sqm) – €/h (total amount of hours/year) – €/workplace unit
Cost driver (not planned activities)	– €/h weekday daytime – €/h night weekday – €/h holiday
SLA	– Carrying out activities in the tender and respect of the frequencies – Compliance with the time periods indicated for the delivery of service – Ensuring an adequate level of cleanliness aimed at safeguarding health and internal user satisfaction – Use of products that meet the current standards, relatively to biodegradability, dosages, hazard warnings – Using machines certified and comply with the applicable accident prevention regulations and dust vacuum cleaners equipped with air filtering mechanisms in output

7.1.2. Courtesy service

Target	– Ensure a level of comfort in the use of adequate sanitary facilities with the intended use of the spaces
Tender documents	– Job description – Regular dispenser (sale or rental) – List of consumables
Technical data	– N. bath – N. internal users – N. dispenser – Average annual consumption
Planned frequencies	– Daily dispenser loading – Monthly supply stocks in site
Cost drivers	– €/sqm – €/person – % discount on price list
SLA	– Use of the products indicated in the price list – Compared the frequency of supplies

7.1.3. Pest control/rodent control services

Target	– Ensure the elimination of the infecting agent for an appropriate period
Tender documents	– Technical specifications
Technical data	– Property floor plans – Sqm for intended use – Sqm basements and ground floor – Sqm outdoor areas – Whether the presence of store type goods stored – Urban environment characteristics – Proximity to agricultural areas – Proximity to waterways
Planned frequencies	– Every six months for disinfestation – Bimonthly for rodent control – Monthly / bi-monthly during the summer for mosquito treatment
Cost driver (planned activities)	– Cost/intervention – N. baits (rodent) – Sqm areas affected by the treatment
Cost driver (not planned activities)	– Cost/intervention

SLA	– Carrying out a tender activities and compliance with the relevant frequencies – Use of products (insecticides, rat poison) comply with current regulations, with respect to hazard warnings – Eradication of the pest for at least 30 days after surgery

7.1.4. Green interior maintenance

Target	– Ensure a level of environmental decoration green interior congruent with the intended use of the spaces
Tender documents	– Technical specifications (activities and frequencies) – List of plants (tree species) – List of products (pots, saucers, flowerpots, etc.)
Technical data	– Quantity of green interior (n. potted plants, tree species) – If rented or owned
Planned frequencies	– Monthly
Cost driver (planned activities)	– Annual cost/tree – €/month (planned maintenance + products)
Cost driver (not planned activities)	– €/h weekday daytime – cost/intervention
SLA	– Carrying out activities in the tender and respect of the frequencies – Use of tree species and products listed in the price list – Durability of trees

7.1.5. Water dispenser

Target	– Ensure the supply/refill of water dispensers
Tender documents	– Job description – List of products
Technical data	– N. internal users – N. dispenser – Average annual consumption
Planned frequencies	– Dispenser loading related to consumption

Cost drivers	– Single dispenser cost – Glasses box cost – Annual dispenser rental cost
SLA	– Use of products indicated in the price list – Ensure supply

7.1.6. Snack dispenser

Target	– Ensure the supply of snack dispensers
Tender documents	– Job description – List of products
Technical data	– N. internal users – N. dispenser – Average annual consumption
Planned frequencies	– Dispenser loading related to consumption
Cost drivers	– Single product cost – Annual dispenser rental cost
SLA	– Use of products indicated in the price list – Ensure supply

7.1.7. Canteen

Target	– Ensure the delivery of hot meals to internal users
Tender documents	– Job description – Food and beverage price list
Technical data	– Canteen type (traditional row, free-flow) – Sqm canteen – N. seats – N. internal users – The use of space index (sqm / n. seats) – Capacity index (n. seats / n. internal users) – Utilization index (meals dd / internal users)
Planned frequencies	– Daily
Cost drivers	– Cost/meal – Cost/user
SLA	– Activities as in the job description – N. of claims/year

7.2. Services to building

7.2.1. Electrical systems maintenance

Target	– Ensure the proper functioning of the systems in accordance with current regulations and the manufacturer's instructions
Tender documents	– Technical specifications
Technical data	– Buildings floorplans – Consistency installations (medium voltage substation, transformers, low voltage general framework, electrical panels, lighting systems, lighting, security lights, power distribution systems, video systems, UPS, generator, grounding equimpents) – conformity declarations – Technical maintenance check lists – Planned maintenance program
Planned frequencies	– Biennial (grounding) according to standard – Annual (medium voltage substation, transformers, low voltage general framework, UPS, generator) according to standard – Six monthly (panel boards, security lights, electromechanical gates) according to manufacturer – Quarterly (lighting systems, lighting) according to routine maintenance
Cost driver (planned activities)	– N. plants per typology – €/h working daytime – % discount on pricelists
Cost driver (not planned activities)	– €/h working daytime – €/h night time/non working day – Availability
SLA	– Carrying out activities in the tender and respect of the frequencies – Execution of maintenance operations in full compliance with current legislation, the CEI and UNI – Use of personnel having the specific qualifications – Use of certified machinery and comply with current accident prevention regulations – H24 availability – Intervention called on time – Restoration of the primary elements in case of failure (even provisionally) on time

7.2.2. Heating and air conditioning systems

Target	– Ensure the proper functioning of the systems in accordance with current regulations and the manufacturer's instructions
Tender documents	– Technical specifications
Technical data	– Buildings floor plans – Plants size and characteristics (boilers, burners, pumps, fans, compressors, chimneys, tanks, chillers, air conditioners, condensers, unit Air-UTA treatment, cooling towers) – Conformity declarations – Technical maintenance check list – Thermal power plant log – Maintenance program
Planned frequencies	– Three-year (tanks) according to standard – Annual (boiler, burners, compressors, refrigeration units, air conditioners, Air-UTA Processing Unit) according to standard – Six-monthly (pumps, fans, condensers, cooling towers) according to the manufacturer's instructions – Quarterly (cleaning filters, belts adjustment) according to routine maintenance
Cost driver (planned activities)	– N. plants per typology – €/h working daytime – % discount on pricelists
Cost driver (not planned activities)	– €/h working daytime – €/h night time/non working day – availability
SLA	– Carrying out the activities provided for in the contract and the respect of the schedule – Execution of maintenance operations in full compliance with current legislation, within CEI and UNI – Use of personnel having the required qualifications – Use of certified machinery and comply with current accident prevention regulations – H24 availability – Intervention (call) on time – Restoring the functioning of the primary elements in case of failure (also provisionally) within the time prescribed by ordinary maintenance

7.2.3. Special plants maintenance

Target	– Ensure the proper functioning of the systems in accordance with current regulations and the manufacturer's instructions
Tender documents	– Technical specifications
Technical data	– Building floorplans – Plants size and characteristics (CCTV, access control, …) – Conformity declarations – Technical maintenance check list – Maintenance program
Planned frequencies	– Quadrterly/six-montlhy according to manifacturer's istructions
Cost driver (planned activities)	– N. plants per typology – €/h working daytime – % discount on pricelists
Cost driver (not planned activities)	– €/h working daytime – €/h night time/non working day – availability
SLA	– Carrying out the activities provided for in the contract and the respect of the schedule – Execution of maintenance operations in full compliance with current legislation, within CEI and UNI – Use of personnel having the required qualifications – Use of certified machinery and comply with current accident prevention regulations – H24 availability – Intervention (call) on time – Restoring the functioning of the primary elements in case of failure (also provisionally) within the time prescribed by ordinary maintenance

7.2.4. Lift/service elevator maintenance

Target	– Ensure the proper functioning of the systems in accordance with current regulations and the manufacturer's instructions
Tender documents	– Technical specifications
Technical data	– Plants description and characteristics (size, payload, landings, …) – Log book/identification number – Conformity declarations

Planned frequencies	– Biennial, according to local rules – Six-montlhy according to manifacturer's istructions
Cost driver (planned activities)	– N. plants per typology – €/h working daytime – % discount on pricelists
Cost driver (not planned activities)	– €/h working daytime – €/h night time/non working day – Availability
SLA	– Carrying out the activities provided for in the contract and the respect of the schedule – Execution of maintenance operations in full compliance with current legislation, within CEI and UNI – Use of personnel having the required qualifications

7.2.5. Building maintenance

Target	– Ensure the proper execution of maintenance operations of hydraulics, carpentry, hardware and construction
Tender documents	– Job description
Technical data	– Sqm buildings – N. end users – N. work interventions/year
Planned frequencies	– On call
Cost drivers	– €/h working daytime – €/h night time/non working day – Availability – % discount on pricelist
SLA	– Execution of maintenance operations in full compliance with current legislation, within CEI and UNI – Use of certified machinery and comply with current safety regulations; – Execution of the maintenance work/service on time; – Rate of remedial action (% effective interventions on the total interventions)

7.2.6. Green areas maintenance

Target	– Ensure a quality level of green areas congruent with the intended use of the spaces
Tender documents	– Technical specifications
Technical data	– External areas plans – Size and characteristics of green areas (sqm lawn, sqm flowerbed, sqm hedges, n. flower boxes, n. shrubberies, n. trees)
Planned frequencies	– According to seasons
Cost driver (planned activities)	– €/sqm green areas
Cost driver (not planned activities)	– Cost/maintenance work
SLA	– Execution of maintenance operations in full compliance with current legislation; – Use of certified machinery and comply with current safety regulations; – Use of products comply with current regulations, with respect to hazard warnings

7.2.7. Fire system maintenance

Target	– Ensure the proper functioning of ire systems in accordance with current regulations
Tender documents	– Technical specifications – Pricelist
Technical data	– Security plans – Fire log – Plant size – Routine maintenance program
Planned frequencies	– Six-montlhy/annual/biennial according to law
Cost driver (planned activities)	– Cost/fire fighting device
Cost driver (not planned activities)	– Cost/work
SLA	– Carrying out activities and respect of the frequencies according to the contract – Execution of maintenance operations in full compliance with current legislation, the CEI and UNI – Installation of fire protection equipment certified and comply with current regulations

7.2.8. Security service

Target	– Ensure the integrity and security of the property and of the occupiers it from damage caused by third parties
Tender documents	– Technical specifications
Technical data	– Hourly garrison band (garrison fixed) – Passes the frequency and duration (patrols) – N. Plants (Remote Control)
Planned frequencies	– Daily
Cost driver (planned activities)	– €/h – N. plants (radio link, alarm)
Cost driver (not planned activities)	– €/h – Cost/work
SLA	– Carrying out a tender activities and compliance with the relevant frequencies – Use of personnel having the specific qualifications – Availability 24 h – Intervention (in case of alarm) on time

7.3. Services to the organization

7.3.1. Reception

Target	– Ensure the access control and the reception of guests
Tender documents	– Job description
Technical data	– Hourly coverage of the service
Planned frequencies	– Daily
Cost driver (planned activities)	– €/h manpower – N. end users – Cost/end user
SLA	– Carrying out the activities provided for in the job description – Speak correctly in local or foreign languages – Proper completion of the ticket register – Wear appropriate clothing

7.3.2. Call center

Target	– To ensure calls receiving, filtering, delivering or closing the process directly as first subject
Tender documents	– Job description
Technical data	– Hourly coverage of the service – N. phone lines (devoted or not) – N. call in/daily
Planned frequencies	– Daily
Cost driver (planned activities)	– €/h manpower – N. end users – Cost/end user
SLA	– Carrying out the activities provided for in the job description – Show courtesy in the telephone reply – Correct completion of the ticket – N. rings to answer – Average time for handling the call

7.3.3. Post office

Target	– Ensuring the levy, postage and delivery of outgoing correspondence and handling of incoming correspondence
Tender documents	– Job description
Technical data	– Hourly coverage of the service – N. end users – N. collection points – N. outgoing correspondence – N. ingoing correspondence – Mail collection and delivery log
Planned frequencies	– Daily
Cost driver (planned activities)	– €/h manpower – N. end users – Cost/end user
Cost driver (not planned activities)	– €/h working day
SLA	– N. delivery/type

7.3.4. Print service

Target	– Ensure the printing and binding of documents or dossiers
Tender documents	– Job description
Technical data	– N. print/day – Productivity index (print/end users)
Planned frequencies	– Daily
Cost driver (planned activities)	– €/h manpower – N. end users – Cost/end user
SLA	– Carrying out the activities provided for in the job description – Respect of deadlines

7.3.5. Document management

Target	– Ensure proper document storage and consultation
Tender documents	– Job description – Stationery pricelist
Technical data	– Archive media (paper, computer, mixed) – Archive type (live, semi active, remote) – Archive size and structure – N. Yearly archived documents – N. Daily consultation requests
Planned frequencies	– Daily
Cost driver (planned activities)	– €/h manpower – Cost/document – Cost/end user
SLA	– Carrying out the activities provided for in the job description – Compliance with the storage policy – N. missing documents/year

7.3.6. Move in

Target	– Ensuring, through the dismantling, packing and assembly, handling within the building or move to another destination of furniture and things without causing any damage
Tender documents	– Job description
Technical data	– Inventory furnishings – Furniture distribution layout – Frequency removals average
Planned frequencies	– On call
Cost driver (planned activities)	– €/h manpower – €/day loading and unloading machinery and transport equipment – €/sqm temporary storage rental – Workplace/cost
SLA	– Carrying out the activities provided for in the job description – N. damaged items

7.3.7. Courier service

Target	– Ensure parcels shipments or small packages
Tender documents	– Job description – Price list (parcels delivery and withdrawal)
Technical data	– Delivery timing
Planned frequencies	– Daily
Cost driver (planned activities)	– N. packages shipped for delivery category and weight
SLA	– Carrying out the activities provided for in the job description – Respect of delivery time

7.3.8. Shuttle service

Target	– Ensure daily transport of personnel in the home-work-home journey
Tender documents	– Job description
Technical data	– Number of service users – Vehicle Features – Km route – Number of stops – Time ran
Planned frequencies	– Daily
Cost driver (planned activities)	–Single ride costs –Daily service fee – Cost/end user
SLA	– Carrying out the activities provided for in the job description – compliance with timetables and route – use of staff with the specific qualifications

7.3.9. Information Tecnology – IT services

Target	– Ensure the proper functioning of IT within the company
Tender documents	– Technical specifications
Technical data	– N. employee – N. items (PC, printer, scanner, fax, etc.) – Licenses – N. server – Local intranet size
Planned frequencies	–Daily
Cost driver (planned activities)	– Cost/item – Cost/end user
Cost driver (not planned activities)	– Right to call – % discount on pricelist (spare parts)
SLA	– Carrying out the activities provided for in the technical specifications; – Availability h24; – Intranet recovery on time in the event of failure; – Annual inefficiences (n.)

7.3.10. Photocopiers management

Target	– Ensure the proper functioning of the company's copiers portfolio
Tender documents	– Job description – Rental pricelist – Pricelist spare parts (toner, stack of papers)
Technical data	– Photocopiers Inventory – Maintenance sheets copiers – N. annual copies – Density index (end users/photocopiers) – Productivity index (copies/photocopiers)
Planned frequencies	– On call
Cost driver (planned activities)	– Cost/photocopier – Cost/copy black and white; cost/copi color – Cost/end users
SLA	– Carrying out the activities provided for in the job description – Annual number of infefficiencies

7.3.11. Telephony management

Target	– Ensure the proper functioning of the company's telephony
Tender documents	– Job description – Contract/device (fixed, mobile) – Contract type (leasing, rental, loan for use, ownership)
Technical data	– N. of fixed telephony users – N. SIM mobile phones – N. devices – Life cycle devices (replacement rate) – Mobile phones spread (SIM/employees)
Planned frequencies	– Daily
Cost driver (planned activities)	– Cost/fixed telephon – Cost/SIM
SLA	– Carrying out the activities provided for in the job description – Annual n. of devices replaced because of a failure – Annual n. inefficiencies

7.3.12. Car fleet management

Target	– Ensure the proper functioning of the company's car fleet
Tender documents	– Job description – Type of contract (leasing, long term rental) – Price list/engine capacity
Technical data	– Size and typlogy of car fleet
Planned frequencies	– Daily
Cost driver (planned activities)	– Cost/car – Cost/end user
SLA	– Carrying out the activities provided for in the job description – Annual n. of failure

7.3.13. Space Planning

Target	– Ensure a space layout update according to the company's needs
Tender documents	– Job description
Technical data	– Devoted IT tool – Workplace lay-out – Density (sqm/workplace) – Move rate (% of workplaces) – Desk shared (% of workplaces)
Planned frequencies	– Density
Cost driver (planned activities)	– €/h space planner – Cost/workplace
SLA	– Carrying out the activities provided for in the job description – Density increase – Space quality improvement

7.3.14. Payroll management

Target	– Ensure a propert pay packet management
Tender documents	– Technical specifications – Devoted IT tool
Technical data	– N. employees
Planned frequencies	– Daily
Cost driver (planned activities)	– Cost/employee
SLA	– Carrying out the activities provided for in the job description – Annual n. of failure

8 Benchmarking: how to apply it to Real Estate

The only way to ensure superior performance in an organization is to transfer (from other sectors or competitors) operating and production programs based on best business practices. This growing process is known as *benchmarking*[1].

Benchmarking is therefore a comparison / analysis that should lead to the identification of "best business practice", not only among competitors, but especially in comparison with companies operating outside of its economic sector. The purpose is the most effective and efficient use of resources, stimulating the creativity of staff, targeting the improvement of the performance of your organization and reducing costs.

Benchmarking can be defined as: «The continuous process of measuring products, services and business practices through the comparison with the strongest competitors or with business leaders recognized in an industry»[2].

It is a way of assessing the management of the company, allowing you to more clearly define goals and standards in order to better adapt to market dynamics.

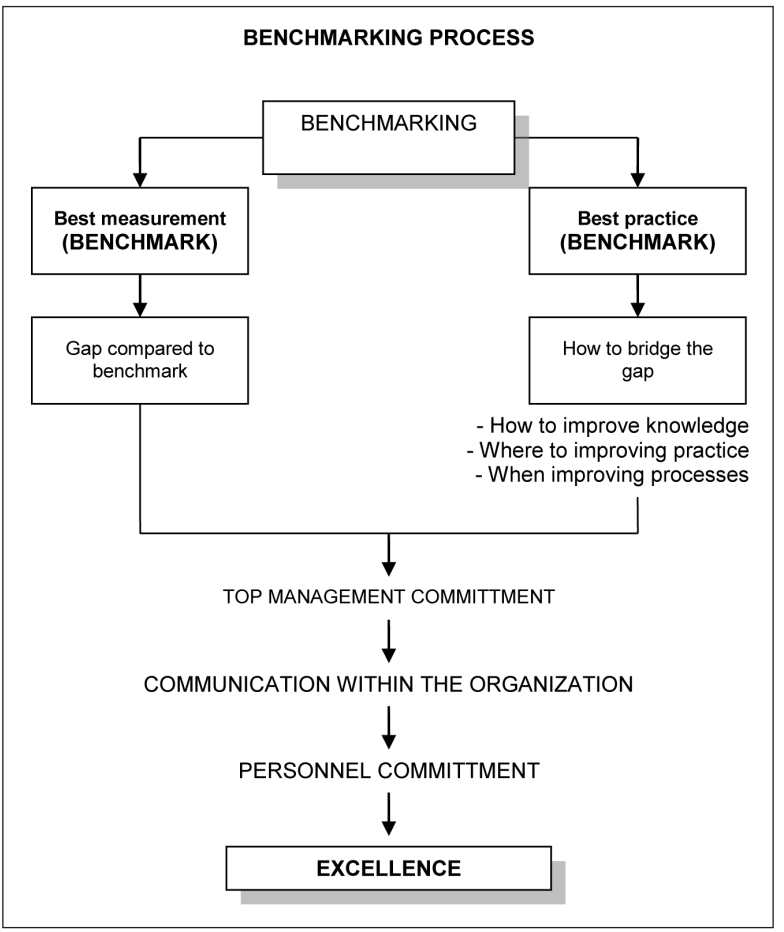
The underlying philosophy of the benchmarking process consists of four elements/phases of work:

– learn about its activities;
– know business leaders or competitors;
– incorporate the best;
– reach the "excellence" in the management of its activities.

1. Camp R.C. (1989), *Benchmarking. The Search for Industry Best Practices That Lead to Superior Performance*, ASCQ Quality Press, Milwaukee, Wisconsin (trad. it.: *Benchmarking. La ricerca delle migliori prassi aziendali per raggiungere una prestazione superiore*, Editoriale Itaca, Milano, 1991).

2. Camp R.C. (1989), *op. cit.*

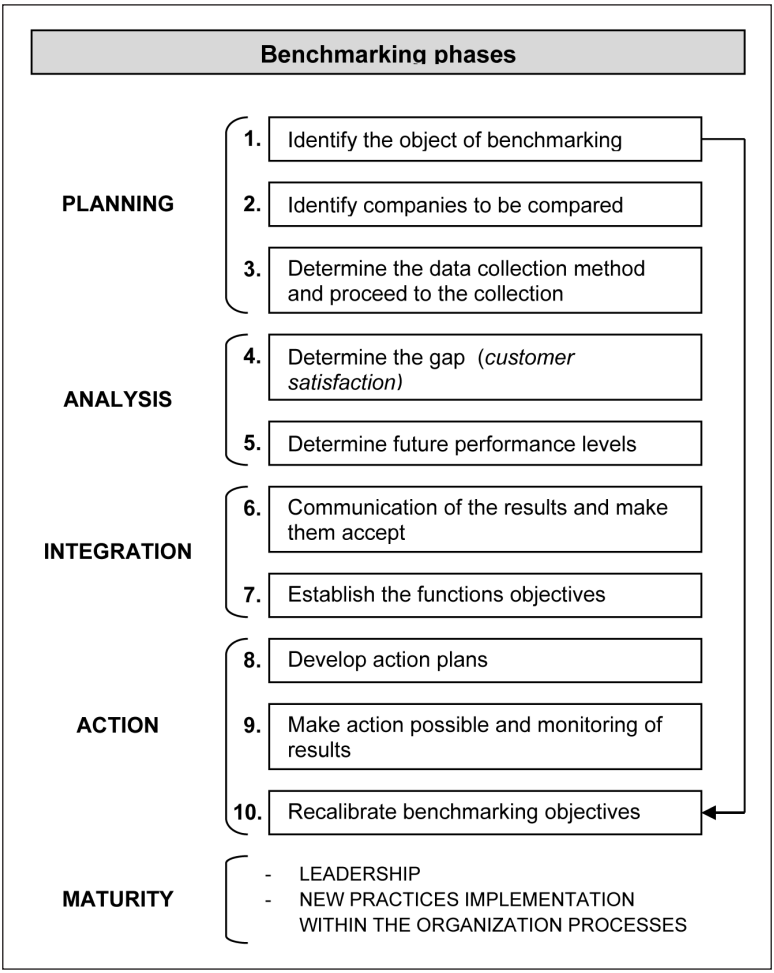
To apply the benchmarking methodology then becomes crucial to analyze the processes that characterize the activities to be improved.



Source: Camp R.C. (1989), p. 24

Fig. 8.1 – *Bechmark philosophy*

In addition to allowing the improvement of business practices, benchmarking allows to develop greater attention to the identification of business objectives and, consequently, can increase the degree of customer satisfaction. Camp divides the benchmarking process in ten steps, forming a continuous loop (Fig. 8.2).

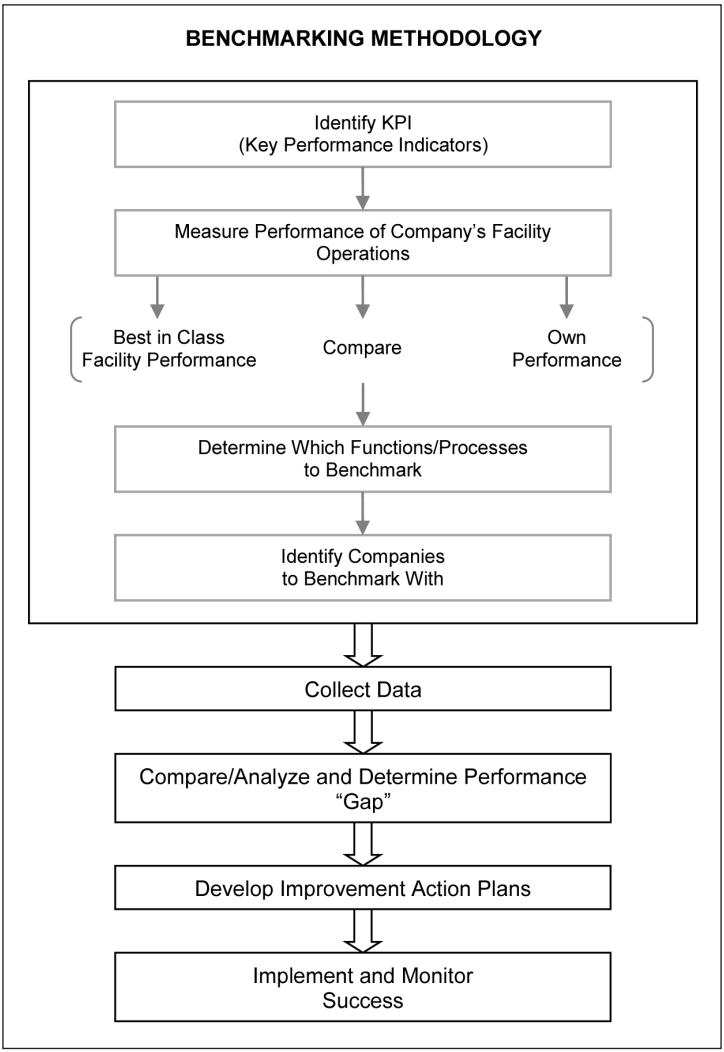


Source: Camp R.C. (1989)

Fig. 8.2 – *The phases in the benchmarking process*

The same process was then transposed and applied to the activities of management of complex buildings (Facility Management) by IFMA - USA (1992).

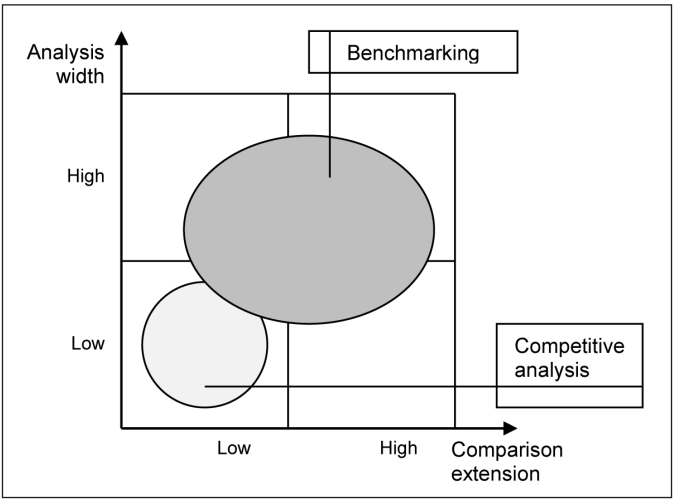
The element that justifies the application of benchmarking practices in the management of real estate assets is the competitive environment which now characterizes the market of Facility Management (FM); both as regards the costs of the services that their quality.



Source: IFMA (1992)

Fig. 8.3 – *Benchmarking methodology*

The purpose of benchmarking activity is precisely to know the best practices in the market and improve performances by learning from "the best in class".



Source: Tellarini F. (1995)

Fig. 8.4 – *Comparing benchmarking and competitive analysis*

The comparison between the benchmarking methodology with competitive analysis (Fig. 8.4), is highlighted immediately as:

The scope of the benchmarking application is very extensive. Benchmarking is placed in an area typically intersectoral and the a level of depth of topics covered is difficult to reach from the competitive analysis[3].

8.1. Benchmarking research in Italy in the Real Estate Sector

Within the GestiTec Laboratory of the Department of Environment Science and Technology Built (BEST), Politecnico di Milano, on the basis of benchmarking models of Camp[4], IFMA[5], Karlof e Ostblom[6], we have

3. Tellarini F. (1995), "Intervento 'Costi logistici e servizio' al convegno *Il Benchmarking: metodologie e strumenti per la misurazione e il confronto dei processi aziendali*", Milano, 22 settembre.

4. Camp R.C. (1989), *op. cit.*

5. IFMA (1992), *Benchmarks 1991*, International Facility Management Association, Houston; IFMA (1992), *Benchmarks 1991*, International Facility Management Association, Houston.

6. Karlof B. and Ostblom S. (1993), *Benchmarking: vägvisare till mästerskap i produktivitet och kvalitet*, Svenska Dagbladets Förlag, Stockholm. (trad. ingl.,*Benchmarking: A Signpost to Excellence in Quality and Productivity*, John Wiley & Sons, Chichester, 1993).

worked a new model to be applied in the Italian context for the realization of benchmarking researches.

The result of this work is a relatively agile and simple model (much less complex references hired by Camp, IFMA and Karlof-Ostblom), which has already been successfully used in diverse applications.

The model is divided into ten steps:

1. identification of the company that requires research benchmarking;
2. description and classification of locations (definition of the types of
3. buildings under benchmarking);
4. definition of the objectives and limits of benchmarking;
5. auditing for the implementation of benchmarking at the client - the benchmarking auditing is done on the basis of a questionnaire specifically defined, divided into nine areas of study, with the aim of detecting specific performance indicators across all the main activities of management;
6. identification of partners to be included into auditing, for the re-organization of benchmarking of their buildings;
7. determining the performance gap;
8. search of constraints in the customer management;
9. proposed management alternatives;
10. definition of the management strategy of short to medium term;
11. continuing the strategy update schedule (Long Race Planning).

The process begins with the input provided by the client and proceeds through the various phases of the benchmarking, and ends with the output management, which provides the definition of real innovation in customer management projects.

8.1.1. Benchmarking inputs

The phases which characterize the input are:

1. company identification (subject of the benchmarking);
2. buildings description and classification (type of benchmarking);
3. definition of the benchmarking goals.

The first part of the process consists in identifying the object of benchmarking. The client must provide all the information necessary to outline the characteristics of its organization, building or Real Estate assets to be optimized in terms of management (geographic location, architectural, morphological, typological, technological features, the specific costs of the various activities that involves the management, etc.).

The next step is the precise definition of the benchmarking goals. Goals that the client wants to achieve according to their own situation and needs.

The appropriate documentation identifying the building consists of: floor plans and architectural sections, facilities projects, management costs, product and service supply contracts and all the feedback set regarding the management.

8.1.2. The analysis

The analysis is developed through three phases:

1. auditing the building / assets of the client;
2. identifying benchmarking partners and realization of auditing;
3. determination of the performance gap.

The auditing of building comes up after the definition of the objectives, providing the auditor the basis of its work (what to look for, what to evaluate).

In the middle stages of the model it could be met the first obstacle (eg the other concerns, the definition of the strategy to innovate the management): identify partners with whom carry on the benchmarking.

Please note that according to the best practices the subject of the benchmarking process is to be compared first with direct competitors and, later, with leading companies in any other economic sector.

In different countries, the difficulty of finding direct partners/ competitors used to develop the benchmarking has been largely overcome and every year several organizations achieve "Benchmarking Reports" on the most significant and widespread types of commercial buildings/ activities (banking sector data centers, bank branches, offices of insurance companies, shopping malls, hotels, office buildings, etc.). This will spread a knowledge that is a very recognized system of performance indicators by type of asset/building or Real Estate assets.

Minor problems involves the identification of leading enterprises of other economic sectors with which to make benchmarking.

8.1.3. The planning

In the phase of auditing for the implementation of benchmarking, an extremely important objective consists in the correct identification of constraints that characterize the customer management. These constraints

can be of different nature, but often relate to some of the professional and cultural characteristics of the client's resources[7].

During this phase the general lines of the projects that contain alternative proposals to improve customer management are processed.

8.1.4. The output

Based on the results of planning and through some specific mode of dialogue with the customer[8], it is performed the final phase of benchmarking.

This activity allows to define the "final report" of benchmarking, which will contain concrete suggestions (what you can get and how to get it) to innovate the property management of the client.

The report will also outline in detail the trends of Real Estate management, in other words a system of "transformation planning" (rescheduled necessarily every year), with the strategic objective of aligning the management of the customer to the best performance outlined by benchmarking.

8.2. How to carry on benchmarking research: a model

The benchmarking model is aimed at the definition of a series of indicators (cost and performance) on the basic parameters used to assess the management of a building/Real Estate. Below is a list of these evaluation parameters, defined as "The parameters for benchmarking of buildings/property assets".

8.2.1. The benchmarking parameters for Real Estate assets

1. *Description of the buildings: identification of variables that represent the characteristics of Real Estate*
   1.1 Different types of buildings (identification of buildings with homogeneous characteristics: intended use, construction technologies, systems, etc.). Activities in the building.

7. Kaiser H.H. (1991), *op. cit.*
8. Kaiser H.H. (1993), *The Facility Audit*, APPA, Alexandria, Virginia.

1.2 Building tenure status (ownership, rental, leasing, etc.)
1.3 Occupied areas within the building
1.4 Occupiers (clients – end users)
1.5 Location

12. Building size
12.1 Gross area
12.2 Commercial area
12.3 Net area
12.4 Area/employee
12.5 Workplace utilization rate
12.6 Average indicators
12.7 Building efficiency ratio

13. Space Planning (space destination)
13.1 Unused space rate
13.2 Space allocation policies
13.3 Size and type of office space:
– open space
– closed office
– team office
– meeting rooms
– ancillary space (break areas, canteen, etc.)

14. Move in and move out
14.1 Removals total number
14.2 Move in:
14.2.1 Move of people – CAT A
14.2.2 Move people + furniture – CAT B
14.3 Move + structural change – CAT C
14.4 Cost of removals
14.5 Total removal cost
14.6 Special areas removal ratio

15. Maintenance costs: direct, indirect and related to main services
15.1 Preventive Maintenance Cost divided into the main areas of activity
15.2 Corrective maintenance devided in:
15.2.1 Installations:
– heating and cooling systems
– electrical systems
– elevators
– security
– fire detection

15.2.2 Building maintenance:
- structure
- finishes
- small maintenance

15.2.3 Chritical interventions:
- requests of intervention (high priority)
- important requests of intervention
- normal requests of intervention

15.3 Cost of internal structure devoted to maintenance activity (management on field)
15.4 Outsourced maintenance
15.5 Cleaning
15.6 External areas maintenance (forecourts, parking, green areas)

16. Energy costs
16.1 Fuel consumption (heating/cooling)
16.2 Electrical consumption
16.3 Water consumption
16.4 Service costs:
16.4.1 Conditioning rate (conditioned/not conditioned space ratio)
16.4.2 Efficiency cost rate

17. Security costs
17.1 Individual protection costs
17.2 Regulatory compliance costs
17.3 Waste disposal and recycling costs
17.4 Security/safety costs:
- fire maintenance
- anti theft alarm
- road markings and signs
- regulatory compliance updating

18. Costs of planning, design and support
18.1 Cafeteria
18.2 Common recreational areas
18.3 Vehicle maintenance
18.4 Car park maintenance
18.5 Postal services

19. Wiring.
19.1 Changes in routine
19.2 Heavy changes
19.3 Enhancing workplace

Planning:
– personnel costs (managers)
– CAD design services
– support internal move
– furniture management and equipment

20. Financial/Economical indicators

20.1 Leasing, rental, depreciation costs

20.2 Operating costs:
- cleaning
- preventive maintenance
- energy costs
- external areas maintenance costs

Fixed capital costs:
- cost of capital
- mortgage debts
- bank interests
- taxes
- insurance
- depreciation

20.3 Occupation costs:
- cost/sqm (sum of all costs previously indicated on the commercial area)
- cost/employee (sum of all costs previously indicated on the total number of employees)

20.4 Budget indicators:
- 1° building budget: total amunt of the costs within the company
- 2° building budget: property market value
- 3° building budget: company total turn over

20.5 Annual cost divided on:
- sqm commercial area
- n. employees
- n. workplaces

It can be seen the parameters for benchmarking of buildings / Real Estate assets are very articulate and have a high degree of detail.

For the realization of a benchmarking analysis the use of all the identified parameters is not necessarily mandatory; in relation to the characteristics of the property, it will proceed to use only some of the parameters with a simplification of the model outlined above.

9 The performance measurement in the services and key performance indicators (KPI)

9.1. Criteria for performance measurement

The belief that the quality of services often is determined by intangible elements and that, in consequence, not measurable comes from the industrial culture and the belief that everything that is not a tangible product with physical and chemical characteristics assessed through tests and instruments, is not measurable.

This assumption has conditioned the recognition of the results so the quality of services in the world; most of the service industries does not have quantitative data relating to the performance not in line with customer expectations[1].

In fact, the literature and the international debate on the issue of the recognition of the quality of services provided precise directions: everything is measured, observed and reported, it is not untangible[2]. But, above all, services have an indisputable and single parameter: customer satisfaction, which is the result of the service.

Thus the service of any kind and scope, finds in this reference its measurable size, generally divided into three levels: accounting of the events and extent of the physical features of the service; observed behaviors; psychological and emotional benefits.

In this regard, over the past 15 years, the business world and in particular management philosophy were the subject of a review of the principles, methods and techniques that characterize the activity, with one common denominator: the target to results and quality[3].

1. Negro G. (1992), *Organizzare la qualità nei servizi*, Il Sole 24 Ore, Milano.

2. Rosander A.C. (1989), *The Quest for Quality in Services*, Quality Press, American Society for Quality Control, Milwaukee, Wisconsin.

3. «The management approach has moved from manager-centred to customer-centred. The emphasys in a modern business context is delivering quality rather than producing quantity», Zairi M. (1996), *Benchmarking best practice*, Butterword-Heinemann, Oxford, p. 391.

Reengineering and redesign of processes, regardless of the company's activities, are increasingly oriented to spread the concepts of quality and value, with the aim of increasing the sensitivity to customer needs, in the case of a product, or of end-users, in the case of a service.

This increase in sensitivity towards customers has led many businesses to consider that:

- the user and not the service provider determines and defines quality and value;
- the evaluation of quality and value to the customer is based on what was actually delivered in terms of results, process quality, price and service acquisition costs;
- user expectations and the end-customer are important elements of perceived value as much as what is actually provided, so it is important to know how to manage them[4].

As a consequence grows the importance assigned to two elements: the quality of the human resources providing the service and the use of appropriate tools.

The company's awareness of the final result, the quality of their product/service and the need to detect methodically the outcome of its activities have led to the spread of the culture of "constant measurement of results or performance".

The measurement of performance in the enterprises can support the management in the definition of corrective measures or new strategies, identifying possible problems, determining new competitiveness parameters.

This new cultural orientation has also affected the world of Facility Management in Italy, in its recent history, and has seen a rapid evolution towards new criteria that determine the service planning, design and delivery.

The technical specifications, the traditional tools used for the selection of suppliers and the definition of service quality levels, are increasingly characterized by a setting "performance" rather than "prescriptive" view; the supplier is not the executor of a long list of operations that will be submitted, whatever the object of the service, but a subject carrying out a final result, it is indicated when his work will have to strive for.

In recent experiences[5] the supplier is measured on the basis of a general

4. Regarding these themes and others: *Principi base della progettazione di processi generatori di valore*, in Heskett J.L., Earl Sasser W. Jr., Schlesinger L.A. (1998), *La catena del profitto nei servizi*, Sperling & Kupfer, Milano, pp. 187-188.

5. It is particularly interesting in this respect the contracts signed in the UK between hospitals and providers of Facility Management, as part of the project financing proposals.

usability and functionality of the building managed and, for each service provided, on the actual availability of the service and respect of the agreed level of quality.

The goal of measuring the final result of the work of a supplier involves, by the customer, the need to establish appropriate performance indicators (KPI, Key Performance Indicators) and a constant detection.

In general, the significant elements for the assessment of a supplier's performance can be grouped into six families, as described in the following pages.

9.1.1. On/off indicators

These are elements which can assume only two possible stages or systems that can be or functioning or fasteners.

In the performance assessment it will count what percentage of these activities has been accomplished or responds to compliance requirements.

In this class we find, for example, compliance with legal or corporate standards, especially with regard to individual protection and safety; but these indicators can also be used as a criterion for indirect efficiency and effectiveness assessment of a preventive maintenance program (for certain installations, critical, scheduled maintenance has mainly the objective of minimizing the risk of plant failure and the resulting suspension of activity).

The test tool can be a spot inspection. For "critical" systems it can provide for the use of check lists, stored on site, where the failures are written.

In cases in which a BMS is running (Building Management System) a functional verification of whether or not a plant/system is working correctly can be carried out remotely.

9.1.2. Customer satisfaction indicators

In this case it is considered as relevant the synthetic judgment, or analytical, expressed by users of the service.

The test instrument is regularly monitored through specific questionnaire. The periodic receipt of customer satisfaction questionnaires

In these cases, the supplier is called to ensure the usability of the structure/buildings, with particular reference to: accessibility, security, functionality, comfort.

can assess what percentage of buildings / properties, with respect to each service, is satisfied or not.

In the recent experience is being used to divide this kind of analysis/ monitoring in two families: “hot “ and “cold” questionnaires.

“Hot Questionnaires” these questionnaires submitted to the end users who made the request for intervention or service and are compiled immediately after receiving the service. In this case users involvement is important; it has the power to activate the service or interventions expressing judgments about the personnel providing the service, at the time of intervention and to its successful conclusion.

This type of monitoring, although it allows a constant control of the service, however, expresses subjective indications and by an audience that usually does not know the characteristics of the contract between the client and the supplier.

In other words, end users judge a service without knowing how much it costs.

For this reason it is appropriate to meet this type of analysis with other evaluations involving a consumer “informed” about the characteristics of the contract, able to balance the overall judgment or assign a relative importance to the results.

“Cold Questionnaires”: are questionnaires addressed to a selected sample of users, with the aim of collecting a comprehensive assessment on the provider’s performance.

In some cases, the choice of services or activities for which users are asked to make a judgment, is made through a questionnaire that allows to define the importance or the weight attributed to services. In this case it will be possible to compare for each service the level of importance and the relative level of satisfaction.

This setting becomes particularly important in the early stages of a contracts, when it could be interesting to see if the service quality levels have been planned properly.

9.1.3. Scheduled activities on time

In a facility management contract, the actions of a supplier generally refer to two main families: the interventions requested by the customer or end-user and interventions based on a schedule of planned activities.

For the latter, the verification of timing and frequency determined by the contract represents a very important step. In fact, if the outcome of the on-demand tasks can be verified because linked to each action, the result of the planned activities is the overall availability of the service

system; any malfunction is detected if no significant adverse effects on performance.

If it is necessary to estimate the level of service for preventive maintenance task, for which a maintenance schedule is agreed by the parties, it is necessary to know what percentage of individual actions under the maintenance plan has been completed on schedule.

The verification of compliance with planned activities can take place through the provision of appropriate maintenance schedules and documents to be kept in the building and located in the plant; sheets and check lists with signature requirement by whom is in charge of the maintenance and countersignature by a controller; also random checks on the state of the facilities can be carried out.

Of course the criticality of this kind of control is that often a strong commitment is required; that's why, in some experiences, it is not preferred to check the respect of the calendar of activities, but rather the outcome of such activities in terms of availability and functionality of the system.

In the case of maintenance, for example, this approach tends to detect some performance indicators, that can be achieved only through proper and timely planned activity; the aim of the audit is therefore a decisive move to control the outcome of the activity.

9.1.4. Response time

In the case of unplanned activities, it is crucial to set a detection methodical system based on episodes of intervention, as a result of activation of the service and the average of the failure resolution time.

The verification of the times of intervention requires that for each service or activity of the minimum time of intervention have been defined within the contract, depending on the criticality of the serviced system/ plant or area.

For the times of fault resolution would be advisable to use the average value, because of the impossibility of defining in advance, without a precise knowledge of the type of anomaly, a correct time of resolution. The most effective tool could be a module recording and certifying the times for each intervention[6].

In cases in which the activation and thed management of the interventions steps through a dedicated Information System, the

6. In reality these indicators are usually managed by Computer Aided Facilities Management softwares.

verification of the intervention times and for fault resolution can occur through the on-line reading of the data relating to the interventions, by updating its database in real time.

Some of the data that a dedicated information system can record are:

- response time (dial-up time to an operator and the operator answers the contact center);
- take-over time (time between the end of the communication and activation of the intervention team);
- operating time (the time between taking charge and the resolution of the problem (definitive intervention) or between taking charge and delimitation (temporary measure).

9.1.5. Assessment of effects

For some activities, a service interruption, even if for a short time, can causes considerable damage (such as the blocking of data communications with the central office). In this case it is important to calculate how many times this fact has happened and sensitize the provider to improve its efficiency.

Therefore it is appropriate to determine "critical levels" related to areas or types of services, linking a possible malfunction and the level of severity of the consequences that this may cause.

9.1.6. Service levels

The measurement of service levels requires that certain quality standards spelled out in the contract (SLA, Service Level Agreement). The nature and quality of these indicators are depending on the different characteristics of the services. In most cases, defining and measuring the respect of quality standards is very complex, in others it is easier to define the standards-objective.

Once defined quality levels/target it is necessary to detect the percentage of events that do not meet these objectives. Once detected the percentage of return in service delivery, is possible to apply sanctions according to the assumptions described below.

Each of the elements seen before must be measured as a percentage of positive events. Next step, for each service, is the synthesis of the views expressed by different criteria, using coefficients expressing the weight/ importance of each item on the service performance.

For each service and for each indicator it can be identified a value-target, defining the allowed minimum level and that will give an objective assessment of efficiency.

For example, if it is established a three hours slot from the call, and a 95% value-target of intervention time, the actual intervention times during the quarter it will detect: if the number of timely intervention is more than 95%, the service it is considered efficient.

The main advantage of this approach is to identify in advance the efficiency level of the suppliers, constantly monitoring their performance and communicating them the results.

When identifying the target values must be taken into account the impact that different choices have on the core business activity; also it must be considered the needs of the provider with which the conditions of asessment must be agreed. So that the indicators are motivating and useful to report any areas of improvement, it is necessary that constitute attainable goals.

Tab. 9.1 – *Example of service level assessment*

Service Air conditioning system maintenance		
Criteria	*Performance*	*Weight (tot. 100%)*
Answer time	76% within the limit	60%
Customer satisfaction	89% positive answers	40%
Service assessment (76% x 60%) + (89% x 40%) =		**81,2%**

The result of the monitoring of services supporting the Real Estate is, therefore, a set of performance indicators, broken down by service and provider; these indicators, to fully exert their validity, require a series of instruments to guide the supplier's behavior in the direction of constant improvement of the level of service provided.

The main tool is, without any doubt, the economic incentive. In this light it is therefore necessary to provide by contract, for each supplier, the possibility of imposing sanctions or giving awards, depending on the assessed level of service provided. This will be a strong link between the quality of service as perceived by the client, and the immediate and future interests of the supplier to keep a good relationship with its customer.

The manner in which remunerate or penalize the provider on the basis of the results are very different. They may be three, able to play the role outlined here.

In comparing the different incentive systems, as cost structure for a company we have considered the following assumption:

– fixed costs for the 40%,
– variable costs for the 40% and
– profits to 20%.

The systems A and B are parameterized on the "expected profit", that is to say that the penalties are calculated on these reference values, while the system C is independent, in part, from the cost structure of the supplier.

"Extra profit" is a contracted fee between the parties that assess the extent of incentives to be offered.

Whereas, therefore, considering a gain of 100 a "zero point", the comparison between the different systems leads to the following results.

9.1.6.1. Case A

System based on rewards and penalties, with a minimum acceptable level of service and standard level area.

Performance and remuneration system: guaranteed coverage of the fixed and variable costs.

– for values between 85% and 90% it is also paid the amount corresponding to profit;
– for values between 75% and 84,9% penalty of a proportional % of profit;
– for values greater than 90% payment of an additional proportional premium (extra-profit);
– below 75% the contract can be resolved.

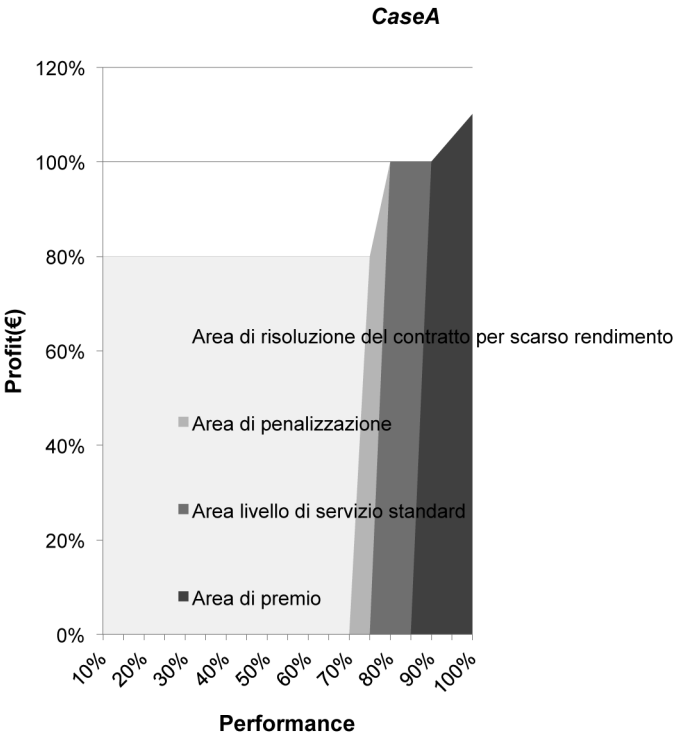


Fig. 9.1 – *Case A: Profit calculation in relation to the assessed performance*

Tab. 9.2 – *Case A: Service assessment and penalties*

Fixed costs	40%
Variable costs	40%
Profit	20%
Extra-profit	10%
Performance	**81,2%**
Penalty	(81%–85%)/(85%–75%)x20=–4%/10%x20= **–8%**

9.1.6.2. Case B

System based on reward and penalty within variable costs limit, no minimum acceptable service level.

Performance and Compensation:

– for values greater than 90% is paid a premium proportional to the amount of the profit plus the extra profit (30);
– below 90% a penalty proportional up to a maximum equal to the costs variables (40).

There is not a minimum performance value.

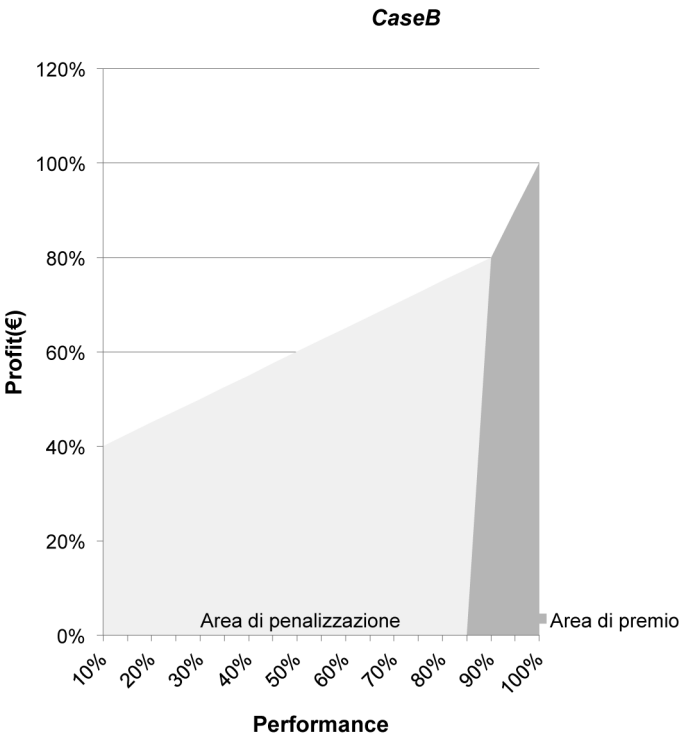


Fig. 9.2 – *Case B: Profit calculation in relation to the assessed performance*

Tab. 9.3 – *Case B: Service assessment and penalties*

Fixed costs	40%
Variable costs	40%
Profit	20%
Extra-profit	10%
Performance	**81,2%**
Penalty	–Profit–(81%-90%)/(90%)x40=-20-9%/90%x20= **–24%**

9.1.6.3. Case C

System with penalty, in the limits of 30%, with a minimum acceptable level of service and standard level.

This hypothesis does not consider, in part, the cost structure of the provider.

Incentive system with different levels of penalties:

– underperformed 80% implies the possibility of contract resolution;
– from 80% up to 97%, variables penalties from 5% to 30%;
– 97% to 100% payment of an amount equal to variable, fixed costs and profit (40 + 40 + 20 = 100);
– when the performance is equal to 100% (!) There is a premium of 1%.

Tab. 9.4 – *Penalties related to the service levels*

Service performance		*% reduction of Montlhy revenues*
Max	*Min*	
100%	97%	0%
96,9%	93%	–5%
92,9%	89%	–12,5
88,9%	85%	–17,5
84,9%	80%	–25%
79,9%	0%	–30%*

** A lower performance to 80%, implies the possibility of contract resolution.

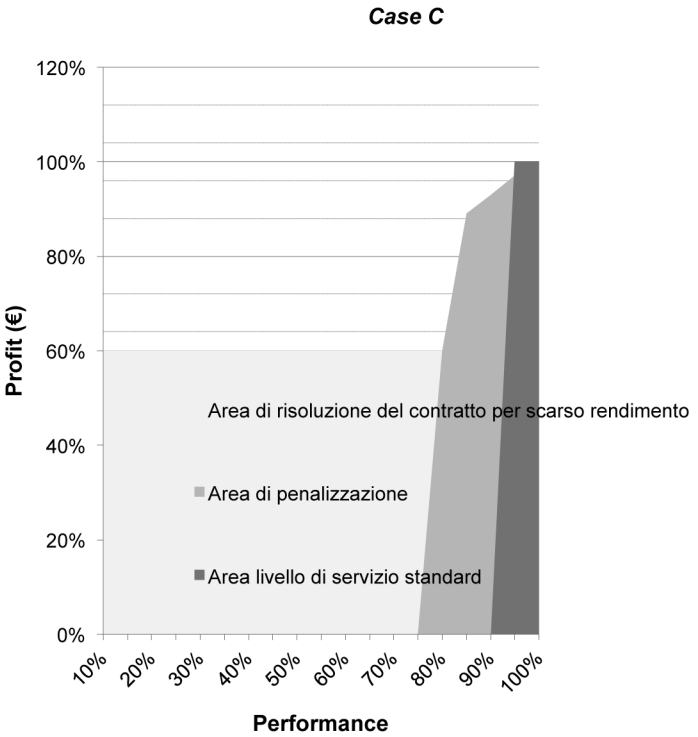


Fig. 9.3 – *Case C: Profit calculation to the performance*

Tab. 9.5 – *Case C: Service assessment and penalties*

Fixed costs	40%
Variable costs	40%
Profit	20%
Performance	**81,2%**
Penalty	According to the scheme = **–25%**

It is clear that this kind of solution involves a heavy work of monitoring and eventual contract revision. It is not only to re-discuss the contract terms due to changes of the situation, but to establish a negotiation process that involves the parties outside the client organization.

It is, in short, to implement a supplier's control system, which requires its active cooperation, with the exchange of information, on both sides, and a sharing of objectives that transforms the client-supplier relationship into a partnership.

In fact, while in the traditional way, the contractual penalty is exceptional and is a symptom of a "sick" situation, in the system previously described the change of economic conditions is routine.

The main advantage is constituted by the fact that the provider, in this way, has an incentive to improve as much as possible the quality of service in a continuous cycle.

Commonly, in the presence of a supplier with opportunistic behavior, we see that the graph of its activity follows a cyclical pattern, due to the fact that his performance decays until it is found a default; then it is notified and the performance backs to acceptable levels (Fig. 9.4).

Fig. 9.4 – *Typical performance of a provider with opportunistic behaviour*

In the presence of a constant monitoring and economic incentives, the trend is different, because the supplier has the interest in remaining in the incentive area or, at least, try to back in that area in a short time (Fig. 9.5).

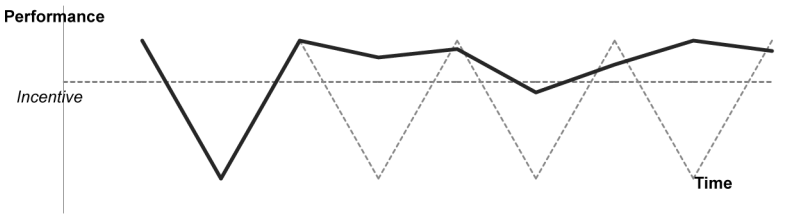


Fig. 9.5 – *Typical performance of a provider within a contract with economical incentives*

In the absence of control, the possibility of modifying the behavior of the supplier and affect the performance is represented by the action of the responsibles for the facilities management and the contract management and their ability to manage the relationship with the supplier. However,

this control mode, as observed in several experiences, is not particularly efficient; first of all because it does not allow a continuous and systematic monitoring, especially in a situation characterized by a very high number of suppliers; secondly, because it is based on no objective tools.

9.2. Key Performance Indicators

9.2.1. Real estate asset register

The Real Estate asset register is the activity with which the stock of Real Estate assets is checked and update, a survey and census of space, its equipment and, in some cases, the staff occupying the spaces is provided.

The objectives of this activity can be different: the traceability of people and assets assigned to them, the management of maintenance and/or spaces, the management of the documentation relating to the items (assets) collected on field.

9.2.1.1. Asset register performance indicators

The parameters to be monitored depend, of course, by the general objectives of the activity. In any case it is particularly significant to take into account:

- the completion time;
- the percentage of input data;
- updating data, resulting from intervention, modifications or transformations.

Timeliness in the development of the asset register: time elapsed between the taking in charge of the service and the completion of the task. All the information that must be contained inside of the asset register have to be surveyed, collected, processed and written in a dedicated IT system.

KPI: execution time.

Level of asset register data entry: percentage of elements/components surveyed. All items are to be surveyed in the field (without exception) and the census data will have to reproduce the reality of the state of art and functionality.

KPI: % of data entry.

Stock level upgrade: percentage of the elements/components subject to scheduled maintenance surveyed and included in the Information System (IS); after each maintenance cycle and/or after each maintenance intervention carried out, all the involved components have to be included in the IS.

KPI: % update.

9.2.1.2. Reporting

The organization of reporting, that returns in summary form the service performance, will be related to performance indicators identified and defined.

In the case of the Real Estate asset register, the reporting activity could be related to:

- the stage of completion, during the course of the service, in particular:
  - the progress of the asset register (type, functional, construction, …) indicating the rooms/spaces and building components detected and recorded at the time of the report;
  - the progress of the asset register (plants and systems) with a list indicating the rooms/spaces and elements/plant components detected and recorded at the time of the report;
- the stage of completion of the Information System devoted to the management (CAFM) (how many changes are needed in the asset register to represent the building elements functional status).

These reports must be written in the forms (numerical, graphical, tabular, statistics, percentage, etc.) validated and, in any case, preliminarily subject to the approval of the client.

9.2.2. Heat management

This service is aimed at ensuring an adequate environmental comfort to the buildings, according to their intended use and in accordance with laws.

The service consists of:

- exercise and operation of the plant;
- maintenance;
- supply of fuel.

Plant operations: includes all activities necessary to achieve the objectives of the service, in particular:

– to carry out work relating to plants functionality (on-off);
– the supply of what is necessary to the smooth functioning of the equipment and installations;
– the measuring and control operations;
– the interventions of adjustment to ensure the comfort of established conditions.

Maintenance: in the field of heat management, includes the execution of all the operations necessary for the maintenance of the plants in condition adequate with the requirements of law, achieving the objectives of comfort.

In general, the capacities must be maintained, as a minimal level of service, in the conditions stated at the time of taking on responsibility (contract).

Maintenance operations are carried out in a planned manner, according to a schedule of operations and interventions that respond to precise frequencies, or corrective purposes, as a result of failure or malfunction.

Fuel supply: the heat management service includes the supply of fuel, so it requires by the supplier the verification of stocks and orders, taking the fuel loading and the assistance during refueling operations.

9.2.2.1. Heat management performance indicators

In the case of heat management, the definition of the parameters that identify the purpose of the service is linked to the comfort conditions.

In fact, for the client it will be relatively easy to check the levels of temperature and relative humidity, a control method with the planned operations for the maintenance of these parameters is more complex.

Tab. 9.6 – *Parameters for the assessment of heat management result: summer*

Parametri ciclo estivo (es. 15/4-31/10)	
Minimum temperature	18 °C
Maximum temperature	27 °C
Relative humidity minimum	50%
Relative humidity maximum	60%
Working hours	7.00-19.00

Tab. 9.7 – *Parameters for the assessment of heat management result: winter*

Parametri ciclo invernale (es. 1/11-14/4)	
Minimum temperature	18 °C
Maximum temperature	According to local rules (municipality)
Relative humidity minimum	40%
Relative humidity maximum	50%
Working hours	7.00-19.00

Each of the parameters may be otherwise divided by type of building, floor or room.

By way of example, a local Data Center may provide for the respect of parameters such as:

Tab. 9.8 – *Esempio parametri di gestione calore di un locale CED*

Parametri locale CED	
Minimum temperature	18 °C
Maximum temperature	24 °C
Relative humidity minimum	30%
Relative humidity maximum	70%
Working hours	0.00-24.00

Performance indicators: percentage of microclimate measurements not correspondent to that level; percentage of plant availability; number of service interruptions caused by maintenance not performed or performed incorrectly.

9.2.3. Corrective maintenance

It is the maintenance consequent to breakdowns or anomalies, with the aim of bringing an element in the state in which it can perform the required function[7].

Assuming an organizational point of view, this activity involves the allocation of responsibilities and tasks, to ensure the fulfillment of the intervention times. Timing and mode of action may be related to special

7. UNI 10147:1993, "Manutenzione – Terminologia"; update: UNI 10147:2013, "Manutenzione – Termini aggiuntivi alla UNI EN 13306 e definizioni".

needs of various types of equipment/systems or critical issues related to different areas or buildings.

To evaluate effectiveness of the service, the corrective maintenance may be related to response times to user requests and fault reports.

In this case it is possible to provide:

– a response time (the signal reception);
– a taking on responsibility time (understanding the problem and start-up / intervention program);
– a response time (the carrying out of necessary activities to restore the original functionality of the element or broken component); the operation time can be further divided, including once for a temporary intervention (action namely aimed at circumscribing the fault and restore the original functionality even in temporary manner) and a time to a definitive action (complete resolution of fault or irregularity).

An example of the relative timing of the fault message, i.e. the "response time", "take on responsibility" and "intervention", is summarized in the following table.

Tab. 9.9 – *Example of timing relative to the receipt of intervention requests*

Categorisation		*Response time*	*Taking on resp. time*	*Intervention time*	
		(phone)		*Temporary*	*Permanent*
E	Emergency	60'' (sec.)	10' (min.)	15' (min.)	24h
U	Urgency	60'' (sec.)	15' (min.)	2h	24h
R	Routine	60'' (sec.)	1h *	In case of anomalies such elements and/or components for which there is maintenance scheduled within a month it is given the opportunity to intervene on already planned. Otherwise (maintenance planned over a month) the definitive intervention must be made within 24 hours	

9.2.3.1. Corrective maintenance performance indicators

The parameters must be oriented to define the final result of the maintenance activity. In this way, control and verification activities

are limited to the most important aspects: effectiveness of the service, availability of the facilities, updating of data (within the CAFM) and related information to the activity as a whole.

Effectiveness of the maintenance service: percentage of the maintenance operations carried out on request of each element/component, that will not involve further interventions before the operation of scheduled planned maintenance. Work must be performed in a proper manner, so that maintenance on demand is kept to a minimum.

KPI: % decisive intervention (completed remedial works).

Plants availability: number of checks in which a plant or its components are found not functioning.

KPI: % availability.

Information system update: percentage of intervention completed but not recorded in the data base.

KPI: % interventions not recorded (target 0%).

9.2.4. Scheduled maintenance

A maintenance activity according to a set plan, based on forecasts, monitoring procedures and use of archival data. Scheduled maintenance is the application of preventive strategies, hence the term "preventive scheduled maintenance"[8].

9.2.4.1. Scheduled maintenance performance indicators

Compliance with the Maintenance Plan: percentage of work included in the Maintenance Plan, not executed by the provider.

Service level: percentage of work not carried out (target 0%).

Explanatory Note: all scheduled maintenance work must be carried out without exception.

Information System Management Upgrading: percentage of executed interventions and not registered in the Information System.

Service level: percentage of interventions unregistered (target 0%).

Explanatory Note: all scheduled maintenance must be registered in the IS and must be coincident with the real conditions.

8. Lee R. (1993), *Manutenzione edilizia programmata*, Hoepli, Milan, p. 15.

9.2.4.2. Reporting

As part of reports aimed at monitoring and representing performance of maintenance activity relative to plants and civil works, here are some performance indicators (KPI's) that can cover both the activities planned that activities on request.

Among them, for example, you will find:

Tab. 9.10 – *KPI related to maintenance activity*

KPI	*Description*
Failure rate	Limit of the ratio of the probability that the instant T of a fault falls in the interval time (t, t + At) and the length of this interval Δt, where Δt tends to zero
Average failure rate	Normalized integral of the instantaneous rate extended to the interval time (t1, t2)
Preparation time	Time from work preparation to that of the start of work
Unavailability time	Period of time during which the entity is in a state of inability to perform its function
Intervention activation time	Time elapsed since the fault detection and the beginning of work
Operation time	Period of time from the completion of maintenance to the beginning of the operation under normal operating conditions
(MTBF - *Mean time between failures*)	Expected value of the operating time between failures
(MTBM - *Mean time between maintenance*)	Statistical average of the times of availability, between two maintenance interventions
(MTTR - *Mean time to restoration*)	Restoration expected time
(MTD - *Mean down time*)	Repair expected time
Intrinsic availability	= MTBF / MTBT
Operational availability	= MTBM / MTBM + MD
Technical availability	= MTBM / MTBM + MTTR

9.2.5. General monitoring

It is the activity through which the complex of services taken in charge to ensure the functionality and efficiency of the buildings, are coordinated and managed. The monitoring service is often assigned the constant task of inspection and verification of usability conditions of the buildings in compliance with safety standards and comfort.

In fact, this activity is a methodical control aimed at preventing the occurrence of failures or anomalies and verify compliance with: safety, hygiene and environmental standards; architectural barriers; safety and security.

9.2.5.1. General monitoring performance indicators

The result is to guarantee that buildings are compliant with standards and rules.
KPI: the number of possible claims by the bodies/offices responsible for supervision and verification of the safety of the buildings.

9.2.6. Document management (print service)

This service typically includes two distinct areas of activity:

– ensure the proper functioning of machines dedicated to document reproduction;
– perform all the operations involved in the reproduction of documents (press center).

The first activity involves the supply of paper, replacing toner and cartridges, reporting out of stock, the management of the maintenance service, meter reading.

The press center activities, however, including the withdrawal of the documentation in the original, the production of copies, post-print finishing and distribution.

9.2.6.1. Document management performance indicators

Copy machines management: the result of the service can be estimated on the basis of two main elements: the availability of the machines and the respect of time of any repair after a failure.

KPI: Number of unavailability due to failure; intervention time.

Print center: in this case the service can be assessed on the basis of respect of the processing time, the delivery of documents and on the quality of work done.

KPI: delivery time (working hours); absence of smears.

9.2.7. Call Center

It is a strategic service for the proper provision of facility management services, delegated to the receipt of requests for assistance or service delivery and then operational start-up activity, transforming work requests in work orders that have to be closed.

9.2.7.1. Call center performance indicator

The results of the service can be identified:

- a period of availability;
- an address and an on-call time;
- a minimum access time from the users.

KPI: number of cases of unavailability; percentage of answers out of time after dialing; percentage of answers out of time (fax, e-mail).

9.2.8. Reception

It is the traditional welcome service, including in many cases the recording of entry and the redirection of external visitors to the various offices.

9.2.8.1. Reception performance indicators

The parameters for defining the result of this type of service are more qualitative than quantitative, being the latter solely related to the service availability time.

Among the qualitative elements it can be found: adequate clothes; spoken language; control that visitors do not access unauthorized areas; compliance with the in and out procedures.

KPI: service availability time; staff presence before the opening of the offices; number of non-compliance with quality parameters (clothing, access to non-permitted areas, etc.).

Of course, in these cases the detection of non-compliance can only be done through random control.

9.2.9. *Checking and assessing service levels*

The most frequently used systems to check the quality of the services under contract, can be synthetically represented by:

– audits and on site inspections;
– detection systems of user satisfaction;
– processing of feedback information.

Checks and inspections: planned or unexpected, are the general control system used to assess the state of the buildings; the systems functionality; the proper execution of assistance; the compliance with applicable regulations; the quality of data entered in the information management system; the fulfillment of the intervention and maintenance programs agreed. These checks, which should always include the compilation of reports and documents to be signed during discussions with the provider, can be carried out directly by the client or by a delegated structure.

Fill in questionnaires: performed to check the end-user satisfaction, they are the most common system to evaluate the performance of the supplier. In some experiences this system provides a detection system called "hot" and a system called "cold".

These questionnaires are loaded into the information management system along with all data allowing the balance of activities; the sum of the individual ratings questionnaires lead to an overall judgment that is generally compared with the result of the "cold" detection.

This is a survey on service satisfaction periodically addressed to a selected group of users, aimed at verifying:

– timing and mode of delivery of services;
– effectiveness of service delivery processes;
– courtesy and professionalism of workers.

This type of survey can contribute significantly to improve the quality of services provided; particularly if the result is compared with the quality expected by the end user, which should be appropriately detected in the initial phase of the contract.

In this way it will be possible to detect the deviation between the expected quality and the quality perceived by the user and, in consequence, an average index of satisfaction for each service.

Through the use of devoted Information Systems, and especially access to data, clients can check in real time the result of the complex system of management and service delivery. Plant availability, usability of the buildings, the effectiveness and the timing of intervention, completeness of the available data can be reported by the processing phase of return data as a result of any activity or intervention, scheduled or on demand.

10 Investment and real estate management costs

The costs that must be incurred to ensure adequate functionality to a building are known, with a general term, as operating costs.

From a purely administrative/accounting point of view, management costs, as regards the fundamental maintenance component and thus excluding all other services essential to the functionality of a building, can be divided into the following two categories.

Extraordinary maintenance costs: means all the actions necessary to eliminate the obsolescence that can affect a building due to the use or to technological innovations and regulations that have occurred subsequent to its realization. These costs, by an accounting point of view, are capitalized and are called in the economic language *Capital Expenditure* (CapEx).

These extraordinary measures have the specific function to replenish the value of the asset and therefore play an equivalent role to that of the depreciation.

It is therefore common practice, as part of an investment property, previously determine the extent of the extraordinary maintenance costs (CapEx) that needs to be tackled in order to safeguard the value of capital invested in the construction or purchase of a building. This method of prior determination of extraordinary maintenance costs is a practice systematically adopted by all institutional investors and in any case by all professionally trained investors in the Real Estate sector.

Unscheduled maintenance therefore represents a real projection into the future of activities that have a strategic function to protect the real value of the investment over time.

Current costs (operations): include all the costs necessary for a full functionality of a property or Real Estate asset. Among these costs also it falls within the maintenance for the containment of faults, which can take the form of preventive activities.

Maintenance activity, in our country, has always been interpreted as a cost necessary to solve, with the least possible expense, the many problems of failure or malfunction of the systems and components that characterize a building.

The effect of this approach has resulted in a critical condition: the bad state of repair in which numerous buildings and Real Estate are.

This approach, however, has revealed in recent years all its limitations, mainly due to the technological evolution that has also affected the buildings.

Today, the buildings are the result of a largely industrialized constructive process as regards both the building component, that the plants/systems. The building process occurs partly increasingly important – especially in buildings with non-residential destination – by the assembly of components and the use of innovative materials.

The plants are grown in importance and, alongside the systems traditionally used in buildings (heating and air conditioning, electrical and lighting, electro-mechanical, etc.), new technologies that have led to a new and increasingly important type of low-current systems have spread: computer networks, detection and access control systems, fire systems, lan and internet, systems of control and management, structured cabling systems and so on.

The buildings complexity is therefore grown and, at the same time, the building component is lightened, leaving the plants the task of ensuring an adequate environmental comfort.

The intermixing of building systems, traditional plant and the new generation of "special" low current installations is so integrated, that the design process is changing; technically and economically it is disadvantageous to design the plants separately from the building component; similarly it is not convenient, in the construction phase, first build the building structure and subsequently realize the different types of installations. The new generation of buildings inevitably lead also into an increase of maintenance activities complexity.

Based on this scenario, a careful evaluation of maintenance economic aspects and, in particular, the cost/benefit ratio with regard to complex buildings, brings out clearly the technical and economic opportunity to overcome the setting of maintenance as a consequence of failures; better point to a scheduled viewing of this activity. In fact, while it was and is relatively easy and inexpensive to do post-failure maintenance in the case of traditional buildings, in the latest generation of buildings it is necessary to prevent the fault that could bring to much higher costs.

In this new situation the ordinary maintenance activities must be planned according to the times and methods of execution that must be

specified with great accuracy, given the diverse and increasingly complex areas of intervention. A maintenance approaches, in this perspective, similar to the industrial one, which oversees the production plant, offering a service that is guarantee of plant productivity efficiency.

For modern commercial buildings hosting economically relevant activities, the maintenance becomes an essential service, as a support to property users.

A service that must be programmed in ways similar to those put in place normally by real estate institutional investors, operating with regard to the extraordinary maintenance (CapEx).

The planned/scheduled approach pursues objectives which the post fault logic intervention is not able to obtain.

10.1. Maintenance as a service

From the conceptual point of view, maintenance has two dimensions: the first is related to the preservation of invested capital (extraordinary maintenance); the second refers to the efficiency and functionality of facilities and building systems (post failure or scheduled maintenance).

Unscheduled maintenance protect the invested capital for the investment duration time and allows the recovery of the capital (protection from devaulation).

Corrective maintenance, on the different forms and ways in which it can be carried out, allows the investment object – the property – to carry out the specific function which it was intended.

It must reflect on the vital role that maintenance activity plays in the Real Estate investment protection and guarantee. Without proper maintenance it would be, in a more or less rapid, deterioration of the building and then to a loss of part of the capital. From here comes the opportunity to conceive and organize the maintenance as a service focused on the primary objective of defense and investment protection and, then, the property value over time.

The transition from the corrective maintenance intervention to a planned objective of preventing the occurrence of the fault, has the fundamental motivation for cost optimization, both as part of routine maintenance activities (through the reduction of faults), that those extraordinary (counteracting the deterioration processes and obsolescence that would entail the need to particularly significant and costly operations such as the replacement of a certain component and the loss of functionality of the property for a given time period).

Maintenance service needs the transition to a complex program of activities planned, both for ordinary activities, that for those extraordinary. It is at this stage that it will be necessary beforehand to proceed with a specific methodology, pursuing some fundamental objectives:

1. careful analysis of the property state of repair and all its construction and plant components;
2. definition of a plan of activities planned throughout the annual period as regards scheduled maintenance;
3. drawing up a CapEx plan during the entire time period determined by the investment strategy.

The economic benefit that may result from such an approach is made up by the savings on future costs in comparison to those that would result if adopted traditional organization of maintenance activities.

It is not only the reduction of maintenance costs (reduction of costs of failures in view of a good scheduled maintenance), but also of less obvious and documentable costs, which, however, may be extremely relevant, such as those deriving from long times of recovery, malfunction or even the block of some plant or building components.

Overall, we can see a lag in the Real Estate market and, more generally, in the Real Estate sector, with regard to the management problems of building management, especially concerning the technical and economic optimization of maintenance activities.

This delay is matched in the situation in which building users are. It is relatively common to know situations in which organizations using for corporate mission, one or more buildings: the management costs of each building are fragmented on different cost centers, this inhibits the ability of an effective control and a unified view of the costs of property management activities and then to organize a precise and effective optimization strategy.

It happened quite a few times to see situations in which different functions (within the building user organisation) interacting in the building management (building maintenance and plant, move in, systems maintenance, front desk, housekeeping, security systems, etc.) act in an uncoordinated and unplanned way. The result of this lack of organization is: the overlap and contradiction during the performance of certain services; the possible expansion of the response times; the discomfort of the user; the difficulty of controlling the services and to identify specific responsibilities in case of inefficiency; the inability to program the technical and economic efficiency strategies.

In our country there are still few facility management companies able to offer not only operational services, but also more advanced services in

terms of business planning, services control, implementation of strategies aimed at technical optimization; in other words, to offer their clients a vision and an organizational support aimed at improving the service management.

It is still not widespread the practice of auditing, aimed at identifying precisely operating costs. It is not popular, at the same level, the method of actual use of the different spaces of the building, the state of repair of the building, maintenance modes, demanding performance standards and actual results achieved as practice to observe.

The audit carried out on a building captures the information base that constitutes a prerequisite for identifying problems and defining the most appropriate strategy for all facility management services required by the client.

10.2. Life Cycle Cost Analysis

Large international organizations property companies, conscious of all these issues, in the ’70s of the last century have led, through the financing of studies and research, to the dissemination of a culture of issues such as: control of operating costs, analysis of costs during the entire life cycle of a building (life cycle cost analysis - LCCA), to get to deepen the relationship between the design choices and construction costs with subsequent problems and management costs.

These large Real Estate and infrastructured organizations have long acquired the knowledge that the production cost of these assets (the cost includes: the cost of the land, of the design and expert consultancy, of infrastructure, construction, insurance, marketing and sales activities, etc.) can not be the sole criterion of economic judgment and choice of design and alternative technological solutions.

For a long time these organizations know how important are the “total cost of ownership”, with a view to a proper evaluation and economic choice among alternative technique, considering the life cycle for which the property was planned.

It can be distinguished between:

– technical lifecycle: the time period after which the Real Estate asset, now obsolete, should be demolished or undergo a radical enhancement process;
– economical lifecycle: the time frame of the investment, after which the property will be sold by the investor to others in order to allow to get the investiment target (return on investment).

In some circumstances the two parameters, technical and economic life, can overlap.

This happens in the case of investments in buildings designed to have a long life-cycle corresponding to the most relevant systems (air conditioning system, usually estimated at 19-20 years).

This occurred for some commercial structures (shopping centers) designed and built with industrialized techniques based on light components (steel structure, concrete bed foundation, curtain wall). In this situation the investor evaluated economically and technically according to a cost-effective view the property life cycle to nineteenth year, after which the building will be demolished and replaced by another project characterized by adequate attractiveness from an architectural point of view, high technical performance (especially from an energy and environmental point of view) and low running costs.

While the technical duration of a building (the technical life cycle) can exceed several decades (during which it will be necessary to intervene with extraordinary maintenance interventions), the economic life cycle (especially for an investor) has a shorter duration; this can be estimated aged between 10 and 20 years. The more a building is located in a prestigious location and the more distinctive architectural features has, even less the property will be interested in selling it; in these cases its economic lifetime could have a very significant duration, the order of many decades.

Instead, referring to the large number of institutional investors represented by Real Estate Investment Funds, the duration of the investment (economic lifecycle) operated by these financial instruments is between 10 and 15 years, after which the building will be put on sale to allow the reimbursement of capital to the fund shareholders.

11 New technologies and new services for workspaces

11.1. Workspaces: technologies and services

Today, the complexity of work activities and their ever-increasing degree of specialization, requires building structures designed ad hoc and able to ensure the efficient and economical performance of the activities.

To achieve the purpose desired, the building size, the vastness of space, the creative value are not the only determining factors. Far more important they appear at the workplace the functionality provided by the technologies that, in a logic of maximizing results and minimizing the initial and ongoing costs, must be an integral part of the building.

As in an aircraft, a ship, or in a chemical manufacturing plant, the multiple systems and technologies must coexist during the design phase with the building structures: buildings must become the result of a new process of analysis, design and construction, extended to all operational needs, ever since the work is conceived architecturally and financially.

The systems integration needs (systems and networks of any type - equivalent to nervous systems in the human body) with the civil works is so strong, it seems unprofitable to keep thinking to conceive and realize the plant facilities in their entirety, or even partially, after the execution of civil works.

Yet, because of habit, lack of information and economic assessment, for separation of responsibilities between user-organization and/or between the organization responsible for the construction of civil engineering structures and organizations will have the responsibility of equipment (design and installation), there are very few initiatives with the goal of integrated design.

It should be added that the growing size (and new structural elements, such as curtain walls) of buildings leads to new management challenges, both economic and technical, to which appears to find appropriate responses with the use of new automation technologies for buildings.

Within Buildings – veritable infrastructures for tertiary and industrial activities – appear, alongside the building technologies, numerous other technologies.

Some of these (for example that of the heating and air conditioning systems) are subject to significant transformations, also because they must incorporate automatic control and supervision systems. The complexity of the systems, their size, as well as environmental and energy requirements need to improve the skills of automatic and planned management. These capabilities are now available with the use of application programs to process control and management. This is one of the first forms of application of innovative technologies in the systems engineering sectors.

Similarly, all type of computer technologies which provide for the control of the other plants present in the building with high functionality content are innovative: computer networks, access control, security systems, systems, etc.

It may be mentioned, among the equipment checked with computer technology, those of generation and transformation of electrical power, the UPS systems, fire protection and extinguishing systems and, in general, all of the energy supply systems, for fluids, in forms adaptable to the requirements.

New technologies based on low currents, on digital signals, the use of hardware and software are present in the fire-fighting systems, security alarm, and others.

In all these systems is found a high or very high presence of peripheral elements (sensors, valves, actuators, for data terminals, voices, images) affiliated to central supervision, through structured networks which form the transport system of all the signals to and from the inner and outer periphery of the building.

In buildings of significant size and complexity, it is therefore essential, the innovative approach to these network systems, in order to ensure lower investment, lower operating costs (operation and maintenance) and lower costs for upgrade over time.

In summary, the technologies necessary to design and simultaneously introduce to those building are:

- automation technologies of the different plants (thermal, electrical, electromechanical);
- technologies of structured and flexible networks for the transport of any type of signal and the related traffic control;
- the technology of integration and full supervision.

In the following picture you may recognize automation technologies used in a commercial building design:

– management of equipment for special environments, laboratories, high-intensity computer systems in offices;
– management of technological and lifting equipment;
– management of installations of distribution of energy and fluids;
– management and monitoring of security systems;
– management of communication networks for data, image and voice;
– monitoring local networks and Internet for information technology support staff; departmental and efficiency control and traffic (via Network Management Systems).

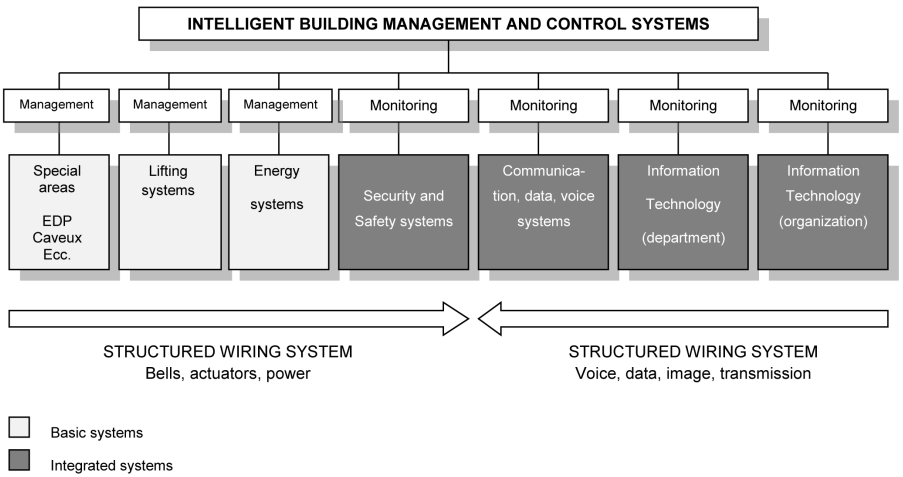


Fig. 11.1 – *Block diagram of a modern Intelligent Building functionality*

These various functional environments, despite having their own autonomy, are connected to a total supervisory system that simplifies control and management and allows useful and interesting interactions, especially in the field of security of ICT systems (Information and Communication Technology).

In the diagram it is implied the presence of different types of structured cabling for which a global and uniform solution is required, able to simplify the transport of data signals to the various systems.

The technology of structured cabling goes together with the technology of local networks and the Internet (hardware and software), and the more the two families are chosen and adopt unified in times and ways, the more you get a system optimized, complete, flexible and economic.

11.2. The integrated design methodology

The methodology of integration of all the systems for monitoring the environment and working activities, from design to construction, can be defined as a plant engineering integration and normalization, complementary to architectural design. The aim is to optimize economic and technological resources put in place to specialize the building to the activities in it or reasonably foreseeable.

We should not forget that among the crucial features even those treated by the staff organizations are included (responsible for safety, the environment, etc.).

The integrated design methodology must take into account the multiplicity of interlocutors and the needs-objectives of the client.

On the side of the Client/User (Fig. 11.2) several corporate functions that should be involved in the project are identified:

- top management who have the final decision and approval;
- Real Estate;
- technical services;
- ICT infrastructure;
- human resources;
- organization;
- group leaders should express their requirements about functionality and performance.

In the past there was a tendency to look first construction requirements, then the plant and, at the end of the opera, technology functions linked to activities in the building. This habit inevitably leads to a fragmentation of projects, although valid individually, do not result in "organic building system", economically and operationally optimized.

From these different projects descends normally a similar approach realization-based, which implies several contracts and determine continuous and systematic interference. From different suppliers of equipment and systems it is difficult to get a coherent and integrated approach to realization, consistency of support, documentation and training for the operation of the systems and all the technological equipment installed in the building to be maintained and managed over time.

The innovative method of integrated design (Fig. 11.3) primarily aims to collect all the requirements-performance by the various organizations involved, without waiting for the structures are already designed or, worse, realized.

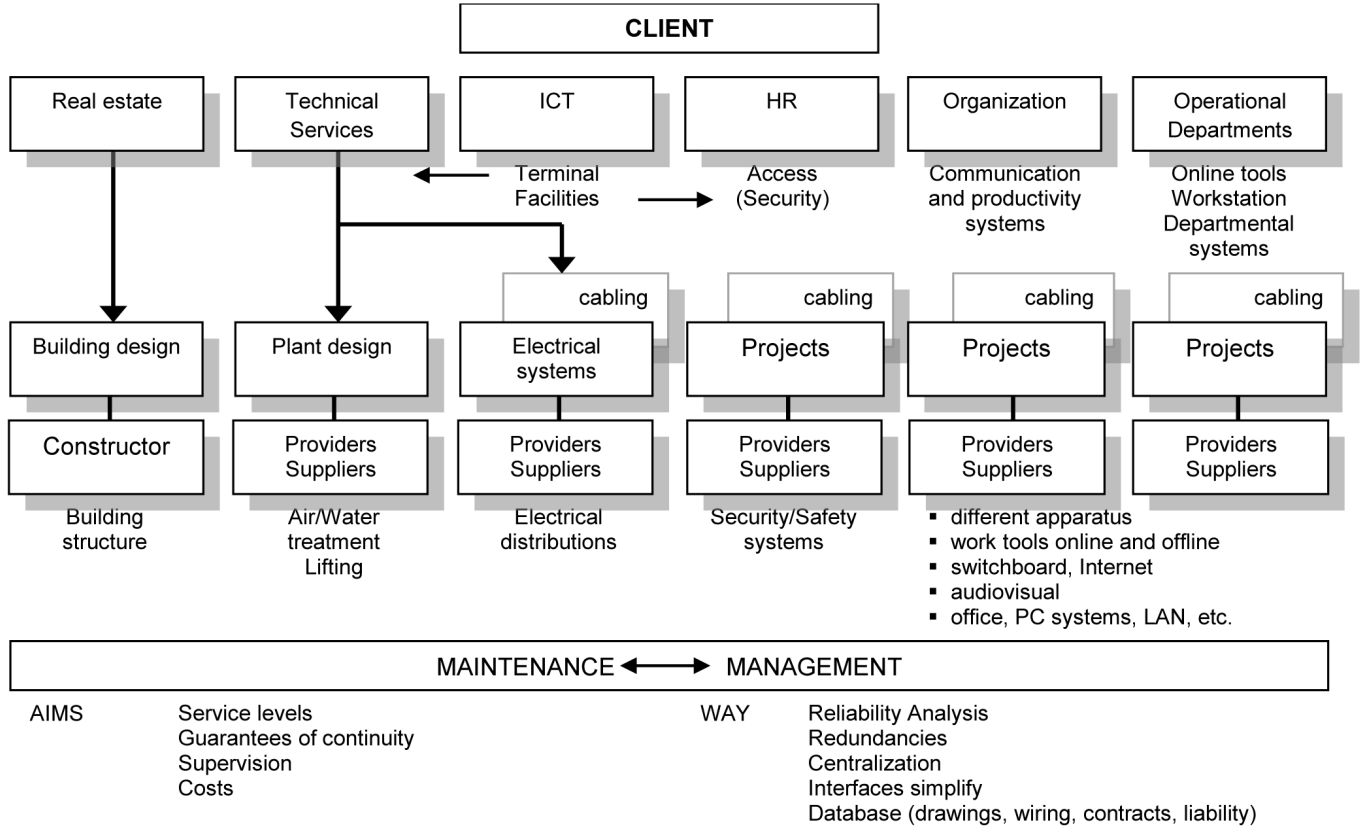


Fig. 11.2 – *Building design-construction traditional approach*

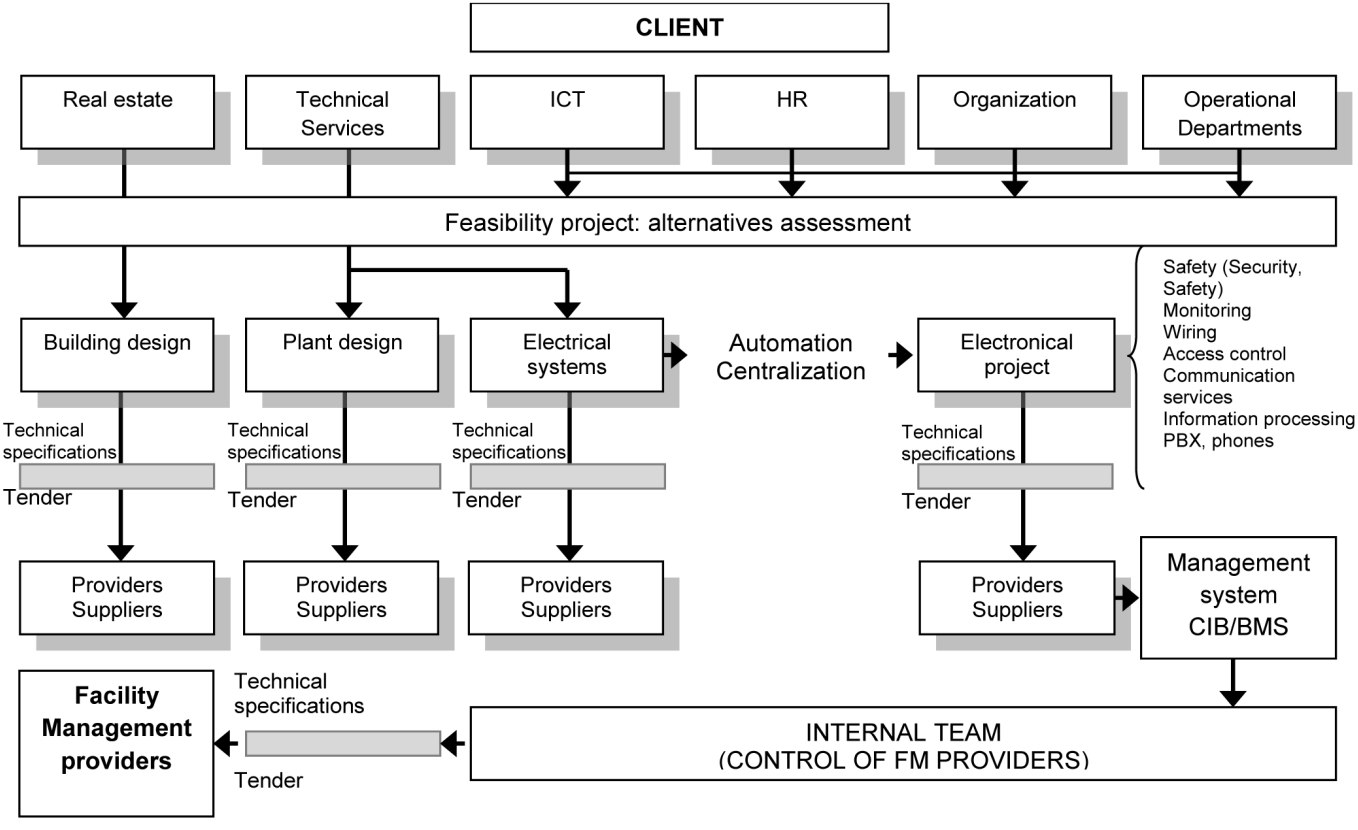


Fig. 11.3 – *Building design-construction integrated approach*

This involves a forecasting effort and resources planning, including future developments and then examining the alternatives in terms of quality of performance-realization costs and, above all, building management costs over time.

The construction project alongside thermo-mechanical, electrical and electronic (special systems) project; coherence and integration of all the technologies, the physical compatibility and the ability to general supervision of all systems in a centralized location are a first result of the integrated approach.

The integrated design approach excludes any separation between the different areas of design, which however must operate in a close way, based on precise specifications provided by the developer that will be detailed in the feasibility project: a real governance of all designs specialist.

The project intervention sequence is therefore multidisciplinary and aimed at all the technologies, without exception.

It will be able to correctly define the necessary services, choose the technologies, properly sizing the plant, do a reliable and comprehensive cost estimate.

Budgeting and estimating the costs of implementation and subsequent management of a building, if not supported by an analytical and integrated design, can be extremely unreliable and cause significant and costly variability.

12 Space Management and Facility Management

Among the tasks that the Facility Management counts there is to manage a building: "in order to create a comfortable environment, optimize the business, increase the degree of employee satisfaction and productivity, as well as cost savings of management and make better use of buildings, to avoid inappropriate actions and errors".

These considerations on the role of facility management becomes very important when a company feels the need to change or expand their work spaces.

Working spaces, especially in the case of innovative sectors, characterized by a high growth rate, can hardly respond for a long time to new requirements determined by the organization transformations:

- changes in the strategic lines of its business;
- growth of personnel;
- expansion into new markets;
- changes in office work technologies;
- acquisition of new companies;
- acquisition of a new major customer.

These are some of the elements that can determine the need for changes in the working spaces of a company.

In this situation the possible alternatives become:

1. designing a Custom Designed Building;
2. change location (to a new building);
3. change of location to an "existing building" - this option inevitably requires adaptations and customizations;
4. restructuring of the owned (and occupied) building with technological adjustments and layout.

Obviously, depending on the choices made, costs can vary depending on several factors such as the size of the required space, the characteristics of the real estate market, the location and the organization's needs. Each of the alternatives has pros and cons.

12.1. The alternatives

The design of a new building (we could say "designed to suit") can respond precisely to the company's needs. The main problem consists in the forward-looking definition of these needs, so that they can be met in time.

The choice of an existing building has the advantage of being able to take full vision of what you could buy/rent. The main problem is, also in this case, in the claire definition of needs, but also in the building performance and efficiency.

For this reason, a solution adopted in different countries is to move towards buildings "shell and core", i.e. buildings of which the developer provides the "rough" structure, with no finishes, installations and partitions. The end user can thus define and specify, according to their needs, the quality of facilities, partition layouts, finishes (such as suspended ceilings, raised floors, structured cabling, etc.).

The occupation of an existing building, especially if an old one, is one of the last options. In this case, the main problem with lies in significant changes that will be needed and difficulties that could be encountered in order to have a proper full availability. In fact, it may happen that it appears necessary to dismantle the existing building, up to bring it back to its original state of shell and core and then redesigning systems and finishes so that it can fully meet their needs.

This type of renovation can be more expensive than the a new construction.

In the case of "hard" building renovation, the crucial point is the definition of a very detailed project that can accurately detect and account for all costs (materials, installation, maintenance, etc.).

The last option, but the first to be considered, in a logical order, by the companies in the process of space changes, is represented by the re-design of the occupied building. When the urgency of change is felt, the first reaction is to look for the quickest way to deal with the inconvenience caused by the works: a new layout, usually represented by a more common open space, with the elimination of cells, boxes and walls that constitute the closed offices, surely guarantees an increase of spaces for new jobs.

However, this solution can not represent a strategic approach, but only a temporary solution to curb the problem, which remains, in substance, the inadequacy of available square meters and, more generally, the efficiency and functionality of the building.

12.2. POE (*Post Occupancy Evaluation*): a methodology to assess building performances

POE (Post Occupancy Evaluation) is a methodology for assessing the "performance" of a building once occupied.

The post-occupancy evaluation is a step of design process of a building, which is usually divided into five distinct phases: investment planning, technical and economic planning, design, construction, occupation of the building and its management in time (Facility Management).

The objectives and the scope of POE fields can be very large.

The POE method can be used for:

- gathering information on buildings that offer high performance, so as to offer solutions (already tested) in response to problems of a lease;
- dealing with an appropriate methodology problems that appear in the immediate aftermath of a "moving";
- monitoring the use of the property mode to define any inefficiencies or problems;
- carrying out audits on the performance, especially regarding the proper use of the space (sqm/employees, FM cost/sqm or FM cost/employee);
- showing successes and shortcomings of the building, so that you it can be available an objective assessment tool useful to guide future research of new locations possible choices.

The POE methodology also constitutes an analytical tool for understanding the degree of user satisfaction with the building. It is essential to understand if the choices made at the design level have been answered in the solution adopted and, if necessary, to define possible corrective actions.

The practical ways in which this type of assessment takes shape involves providing tools that have as survey target the relationship between users and their place of work.

The POE verification consists of questionnaires, interviews, talks that aim to collect as much information on the functional and working methods taking place inside the building (Fig. 12.1).

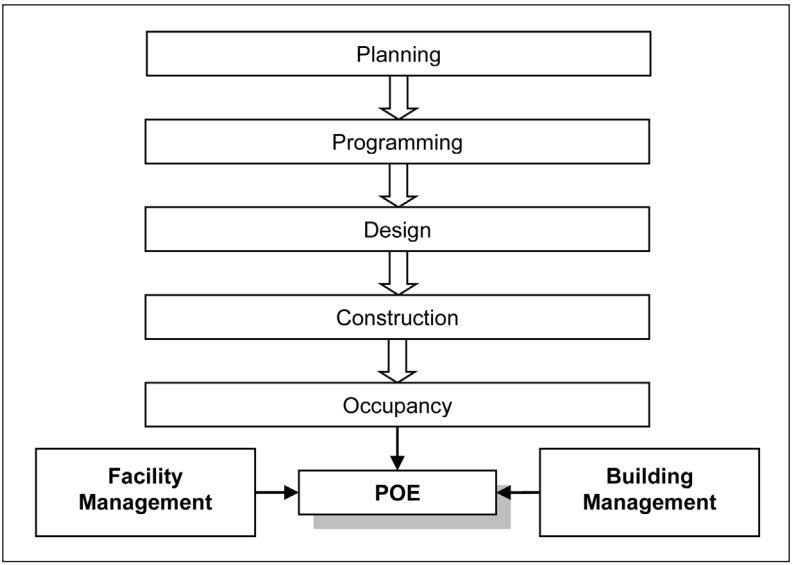


Fig. 12.1 – *POE within the building design process*

The post-occupancy evaluation analyzes the use of the building, excluding all technical measurements such as, for example, heating, cooling, etc. The performance of the technical elements and systems is then considered only from the point of view of the effect that has on health, safety, welfare, functional, psychological and physical comfort of the occupant/users. Everything concerning the real performance of plants will be analyzed instead through tools such as auditing and benchmarking.

It is, therefore, a rigorous and systematic process of buildings use evaluation, allowing to focus on occupants and their needs, providing feedback with the primary purpose to provide accurate information to improve the overall performance of workspaces, and then determine a higher level of comfort, safety and perception of work environment.

From the analysis are extrapolated qualitative judgments; these judgments compared with the actual performance of buildings, determine the assessment.

Evaluation means the difference between predetermined standards of quality levels and the real performance of a building expressed by its occupants.

12.3. POE (*Post Occupancy Evaluation*) in the US

Historically buildings have always been evaluated and analyzed, but their complexity in the current phase of history has grown a lot and then today a more structured approach in conducting these investigations is necessary.

Early efforts directed towards a definition of a method have occurred in the US in the early 60s, following the need for assessment of problems encountered in some hospitals and military centers. The main interest of the studies was initially designed to assess safety, health and the psychological effects on the occupants of the buildings. They wasn't structured studies, but already outlined a complex discipline where was essential the contribution of different professionals: designers, facility managers, interior designers, psychologists, sociologists. The first satisfactory results were obtained in the analysis of university residences (colleges).

In the '70 the POE methodology spread in a more comprehensive way as a method of systematic buildings evaluation. This method was used at the time of large-scale urban level, especially in a social perspective: one of the arguments put forward by Newman[1] in 1973 was the definition of the link between the quality of public housing construction and urbanization and the development of illegal and criminal activities.

Subsequently, studies were conducted in more restricted environments, and in 1976 was made by Goodrich[2] the first POE in office buildings.

Among other things, this research involved the analysis of the responses of six hundred workers to a new lighting system in a open space.

In 1978 he was published the first book on POE and was given a first definition as: "the assessment of the conformity degree of an environment designed to the needs and explicit and implicit values of individuals"[3].

The text clarified how POE evaluation of a building should include a significant sample of all occupants/users and have the purpose of a complete analysis of all elements/user perceived effects: safety, functional needs, natural and artificial light, acoustics, colors, materials and everything that affects the human dimension psycho-perceptual.

The characteristic of POE in the '70s was the attention that was placed to the user's satisfaction, while the technical characteristics of the

1. Newman O. (1973), *Defensible Space: crime prevention throught urban design*, Collier Books, New York.

2. Goodrich R. (1976), *Post Design Evaluation of Centre Square Project*, Atlantic Richfield, Philadelphia.

3. Friedeman A., Zirming C., Zube E. (1978), *op. cit.*

environment and the analysis of the organization and content of work were left out.

The ’80s were a period of maturity: the dissemination of the methodology and new studies and research led to the introduction of some enrichment and a greater focus on the physical environment and work organization.

The results of these insights show that the degree of an individual’s satisfaction with a building also depends on the organizational structure of work and physical-technical environment.

The fundamentals for the realization of POE ratings are based on four basic steps:

1. defining the scope and purpose of the analysis;
2. selection and analysis of quantitative information;
3. identification and examination of qualitative information;
4. processing of results and definition of the model resulting from the analysis.

POE method is of course in the process of a continuous improvement and development and today in the United States is increasingly used in the management-planning process for a new location, especially during the design phase. In the United States there are several training programs and specialist courses in this field.

The POE methodology defines an evaluation of the performance of the building from the point of view of users.

In order to be clear the scope, it is necessary to define the concept of “efficiency” of a building, which is the philosophical and conceptual basis of the POE.

In the following figure, is illustrated the criterion by which is measured the performance of a building: it is a measurement for comparison between the *Performance Criteria* predefined in accordance with the objectives of the client, the characteristics of the building and its performance, a comparison conducted through the analysis of users perceptions.

The *Performance Criteria* are divided into quantitative and qualitative criteria: the former are easier to define, as measured objectively with systems and procedures notes, while the latter are more difficult, as the expression of views, of subjective opinions.

Quantitative criteria: acoustic, thermal comfort, lighting comfort, material quality, size of the space and subdivision (sqm/mployee ratio), etc;

Quality criteria: quality of space, furniture, quality of services to the people, etc.

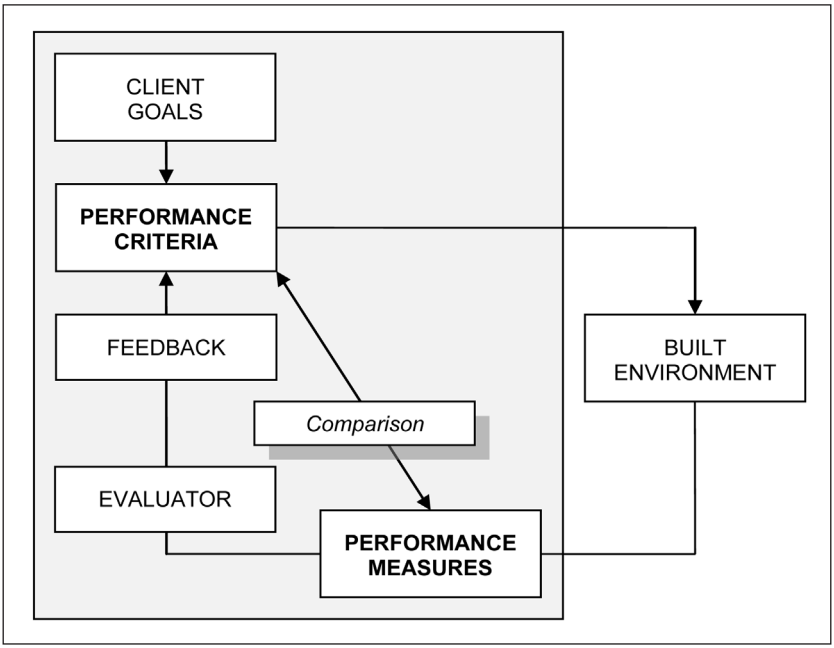


Fig. 12.2 – *Building performance assessment model*

Apply the principles of POE (Post Occupancy Evaluation) has the general objective "to design and build buildings that improve over time the built environment and respond more adequately to the needs of the occupants".

Fig. 12.3 shows the relationship between POE methodology and a building implementation process. The application of the methodology could avoid mistakes (in design and construction) often sistematically repeated in time, because the needs of users are not adequately known.

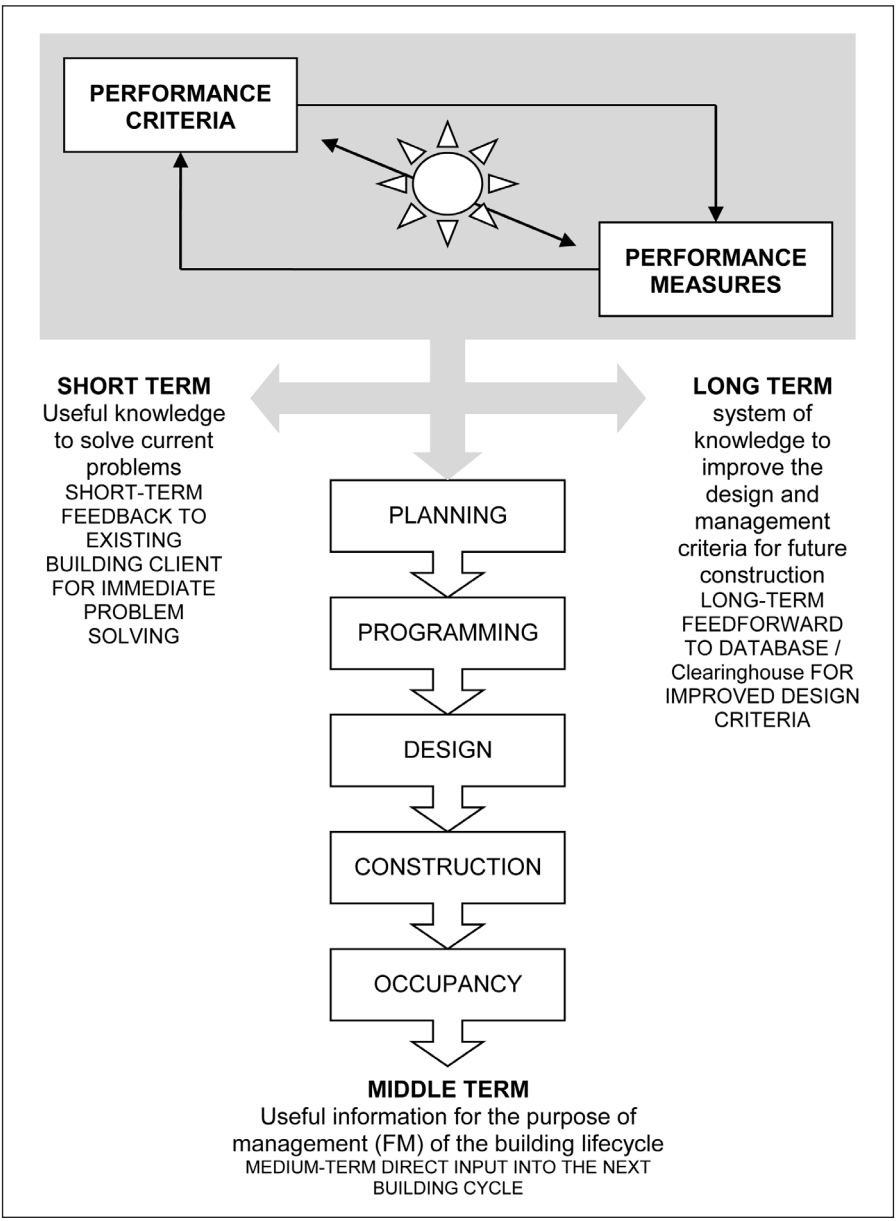


Fig. 12.3 – *Utilization of knowledge systems resulting from the application of the methodology of analysis Post Occupancy Evaluation (POE)*

12.4. The three levels of POE (*Post Occupancy Evaluation*) methodology

First level - Indicative POE: it provides an indication of success and critical issues in the building performance; It is conducted in a very short time (an average of two days).

Second level - Investigative POE: it is more structured in terms of time, resources and analyzed data. It serves to deepen the problems highlighted by the Indicative POE.

Third level - Diagnostic POE: it is the full-depth analysis of the building performance.

The results of this study are indications aimed at resolving long-term problems, to work improvements, and not of a single service. Its results are used for understanding in-depth the characteristics and performance of a building, forming the information basis for the realization of future buildings.

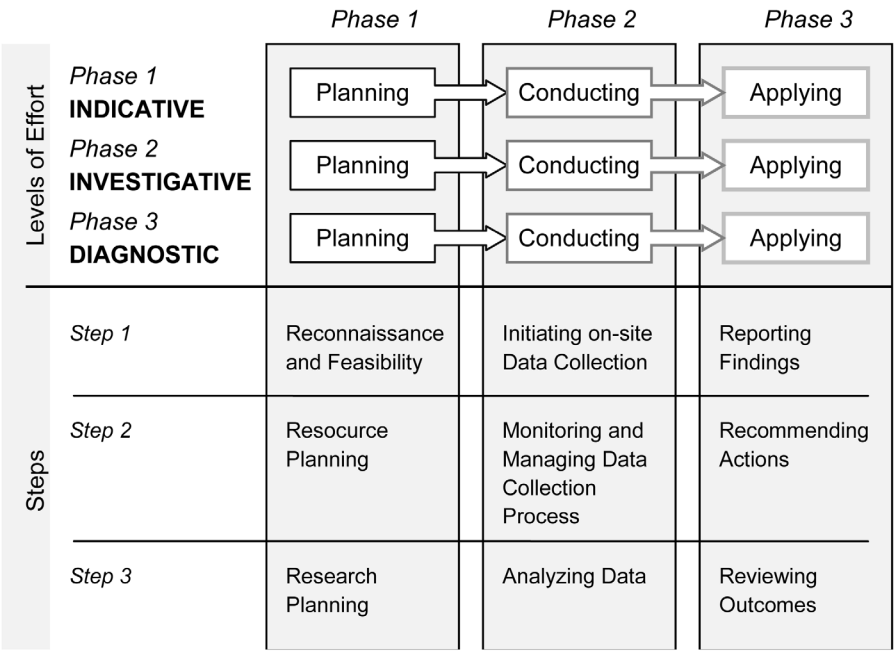


Fig. 12.4 – *Post Occupancy Evaluation (POE) process*

12.5. The organization of the move (move in): a critical moment

Now exist also in our country several companies specializing in the removals design and implementation.

In the US several company operate that way, in addition to offering moving services "turnkey", also take care of the construction services that may be needed to complete the building that will be occupied.

Moving an organization takes time. this time can be reduced dealing with multiple tasks at the same time, but in any case it is needed to carefully evaluate the time required for completing the transfer: a period that in many cases will not be short, and that not because of negligence or mismanagement, but for the complexity of the problems related to the handling.

Tab. 12.1 – *I indicative times required for the transfer of a complex organization*

Action	*Timing*
Definition program of needs	2 months
Definition of spatial needs	1 month
Developement of the budget parameters	2 weeks
Space research	4/8 months
Target setting for the space	1 month
Negotiation of the spaces (supply)	3 months
Design, floor plans, permits	8 months
Construction and equipment of the space	9 months
Transfer	2 weeks

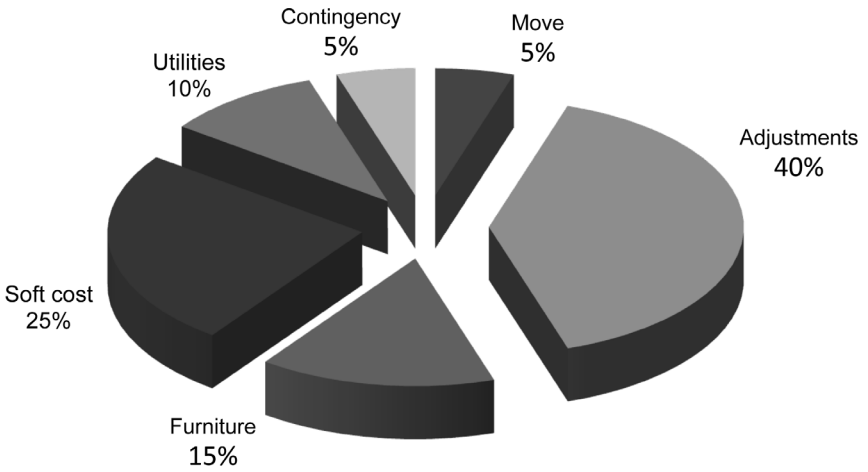
Source: Preiser W. (1989)

Moving an organization is expensive. There are not only the costs of building construction or reconstruction, but it is very important to consider that a significant percentage of the costs will be constituted by the cost of transfer (move in). All the costs must be previously scheduled and then be subjected to a careful control.

It is also crucial to establish precisely who will be in charge of decisions within the company. Every detail must be carefully analyzed.

The *utilities* include all costs related to electrical installations, telephone, data, etc.

The *soft costs* represent instead the costs of planning, project management, construction management and consultants.



Source: Preiser W. (1989)

Fig. 12.5 – *Breakdown of transfer costs of an organization in a new location (new building)*

In a proper assessment, location, building; space; environment need to be comprehensively analyzed.

Often the clients who are looking for buildings are unfamiliar with the analysis that could lead to the company's location. In the US the structured methodology to accomplish these analyzes in depth has been precisely defined.

13 Facility & Web

Computer aided facility management technology (CAFM) has long been an "ideological" hypothesis, rather than a reality: many products with this acronym in fact were nothing more than a mixture of old database connected to the management of CAD format files.

Over the past few years, the most important software vendors for the facility management industry have developed their products to enable them to achieve the integrated management of Facility Management services: *Computer Integrated Facility Management* (CIFM) is now a reality.

CIFM is a relational database able to manage, through a single interface, CAD images, project management programs, economic and financial management controls of orders, maintenance plans, HR management, etc.

The Internet development has contributed significantly to the simplification of CIFM technology allowing the browser interface to manage html files on company intranets.

Nowadays, several Facility Management companies, use CIFM software to address and distribute information to a large number of employees working in the area of Facility Management services (Building Managers, Facility Managers, Area managers or specific contracts Co-ordinators, etc.), but also to the responsible on the side of clients.

The Internet allows the distribution of images, projects, tables, reports, originated by CAD systems and/or sophisticated relational database, without which users needed to have on their personal computers sophisticated and complex programs.

The CIFM technology is expected to weigh heavily on the processes by which companies deliver and control facility management services offered to the market.

13.1. Application areas of CIFM technology

The American Center for Productivity and Quality (APQC) has carried out a study on "Improvement of Facility Management services through the ICT (Information Communication Technology)"[1].

In this study, through the analysis of many enterprises study cases, have been identified experiences able to represent some best practices with regard to the use of CIFM systems.

The study has also identified the most significant areas relating to the application of CIFM technology:

– sharing of objectives between supplier and customer;
– evaluation of the operational performance of a contract;
– ability to track information;
– creation of information support and reports;
– trend analysis;
– graphic and database connections;
– global employee/clients access;
– comparison with other organizations.

Actually, not all organizations analyzed in the research have CIFM applications in all areas mentioned above. However, the research shows that the analyzed organizations try to use the CIFM technology in areas considered strategic, as regards the Facility Management services.

Precisely because of this discrepancy, each organization analyzed by the research is an experience in itself, an "original case" study.

Below some of these case studies are examined.

13.1.1. University of California, Santa Barbara (UCSB)

The University of California - Santa Barbara (UCSB), located in 500 buildings, with a total gross area of 2 millions sqf[2] functional to educational purpose and research activities, has decided to launch a project whose objective is the use of CIFM for the overall management of their technology (space planning) and their related services (cleaning, catering, reparative maintenance, interior movings, wiring and installation of new workstations, etc.).

1. Per approfondimenti vedi il sito web del Centro: <www.apqc.org>.
2. 1 foot = 30,48 cm (1 square foot = 929,0304 cm^2).

The launch of the project involved the digitization of more than 300,000 drawings, some of which date back to the 40s.

Gail Johnson (UCSB manager and project manager) reported: «the availability of plants and buildings sections of the University has been an essential element to decentralize the space management and a good part of the services to the different departments within the campus».

Today, every department of the University is able, during the business planning of any academic year, to make projections and simulations on the necessary spaces in relation to: planned courses, seminars, workshops, conferences, etc. The CIFM system allows, in relation to different types and amounts of space required by each department, to predict cost, maintenance activities and services.

The head of the project at UCSB highlights as one of the most important goals of the project was precisely to: «enable end-users (departments) to manage directly the spaces in their possession and all the services connected to them».

According to Gail Johnson, every year the University is handling thousands of orders to modify spaces, manage removals, enable new workstations. Switching to a direct management of these activities by departments (as part of the plans and central control realized by the "Administrative Centre" for which Johnson is responsible) constitutes a significant advantage, both as regards the effectiveness and timeliness of activities/services, both as regards the operating costs.

In his report Gail Johnson also highlights another objective of the project: the management (from procurement to disposal) of all hazardous materials used in many laboratories of the University.

The use and management of hazardous materials is critical not only because of the restrictive rules imposed by federal and state agencies, but also to respect the constraints and parameters imposed by fire regulations.

Today is possible, for the vigilant state authorities and the fire department to get, in emergency situations, through the intranet of the University, the environmental characterization and hazardous materials present in the areas affected by the emergency; this allows to identify any potential hazard and adopt the most appropriate intervention procedures.

13.1.2. J.P. Morgan group

The banking group J.P. Morgan in New York uses CIFM systems to manage a network of about 6 million square feet on total 8.3 million square feet of its offices.

The Vice President Deborah Lott, head of space and related services at J.P. Morgan, used the Intranet of the group to plan and manage in a decentralized way all the management activities of the spaces and the related services.

In this way the CIFM system database is accessible to a large number of employees in different locations. Obviously, access to and utilization of the system are regulated by strict security rules allowing access and utilization in relation to the user's hierarchical responsibility, through a system of passwords and access codes.

13.1.3. RICE University

Another organization that has pioneered the adoption of CIFM networking tools is the RICE University of Houston, known for the architectural quality of its campus.

According to the Head of Facility Management Services of RICE, arch. Seller Wolff, with the use of the system on an Intranet, they can be managed many activities: «The budget management of individual services, the design of new spaces, the space planning, all the services delivered to people and this both at the individual building level, which at a Campus level».

The heads of departments can even use the system to require air conditioning ignition in certain classrooms and offices outside of normal university working time, in a flexible way.

13.1.4. CONOCO petrol company

The Oil Company CONOCO has used the CIFM technology on an intranet to improve the management of workspaces in its different locations in the US.

The server, located in the company's headquarters (Houston), allows decentralized management of many services, under the control and within corporate standards defined by Steve Moskowitz, Director of Facility Management services.

Thus, the 2,600 employees of the office of Houston and the other 6,000 seats of Lake Charles, Touca City and Englewood, are able to program the service requests related to their work.

Of particular interest is the procedure setup with regard to: meeting rooms and conference requests and the reception/secretarial services;

reproduction of materials; refreshments; cleaning and use of technical equipment necessary for meetings (beamer, simultaneous translation, etc.).

The CIFM system database makes available online to the CONOCO managers a calendar that allows everyone to easy plan their need for meeting and conference facilities and related services. Thanks to teleconferencing system that integrates voice, data and images, the system can also organize net-meetings to which employees and/or customers, spread in conference rooms of various company locations, can e-participate.

According to data provided by Moskowitz, with the new CIFM at CONOCO, the system is able to optimize the use of meeting, conference rooms, and net-meeting, recording an increase in the use of these spaces by an average of 22-23% to ' year. This better use of the spaces has resulted in a significant reduction of the external temporary locations and therefore also a significant economic saving.

13.2. "Small Facility Management" and "e-Facility Management" development

The research conducted by APQC (American Center for Productivity and Quality) shows that, while some organizations have used the CIFM technology to decentralize many of Facility Management business, other companies have focused on a range of strong decision-making and operational centralization. Different goals that found in the CIFM technology a tool to carry out projects aimed at rationalization of business services and their costs.

Today, the fast development of network applications is transforming the traditional ways and organizational criteria of facility management services in large enterprises. But it is now clear that, in the near future, the availability in the network of large bases of easily accessible real time data opens the way to new services and innovative management systems.

The CIFM network technology, for example, makes possible to facility management companies the developing of a range of new services delivered to the market, that of small and medium enterprises, which until now have been excluded from the dynamics of the market services.

Born thus the "small Facility Management" or "e-Facility Management", i.e. that type of low value-added services that until now the supply of facility management services has neglected-to, but which, if managed through Internet, can allow the aggregation of demand and determine commercially viable "volumes".

The small facility management covers the provision of stationery, study and graphic realization of catalogs and brochures, printing services, but also space in planning services, providing software and consulting services for a period of time, motor vehicles or hardware rental and/or leasing.

It begins thus to open up, even in our country, a new area of facility management development: thanks to CIFM technologies a new market, based on the strong interplay between the organization of services to buildings and businesses, is developing and growing really fast.

13.3. Information systems for Facility Management

The aims and objectives of an information system for technical and operational management of Real Estate assets are to provide all the knowledge necessary to perform optimally the operational activities of Facility Management.

To be able to respond, in short term, the needs of different actors involved in service management, it means using tools that allow to make appropriate and concrete solutions aimed at matching the needs identified. Clear and detailed information can be obtained only if generated by properly organized procedures including the profile of the people who will use it.

To understand the opportunities available through new technologies related to the Information Communication Technology and so have to figure out what are the useful tools, it is necessary to define the objectives to be achieved through Information Systems. Every building has unique technical systems, features and characteristics that must be known through a proper collection of information on field, in order to get the information of each individual and functional element needs, and design optimal solutions.

The benefits to be obtained by information systems devoted to property management, are certainly the availability of information and the speed with which they are obtained, the ability to integrate systems with different applications but with a unique purpose; besides, the availability of efficient operational tools increase the productivity of the systems in a shorter time.

The uneven spread of technological innovation and information systems in the different Italian realities (buildings owners and users) essentially involves the following issues:

- a poor integration between information systems and applications;
- a duplication of files and functions;
- the failure to meet specific needs of the systems;
- investments not organized by priority and strategy.

An information base is required for all activities that are carried out in buildings: from information related to material goods, individuals and business purposes up to the interface with support archives.

There are fundamental data and information that are required by law (among others the building permit or the compliance of a plant), while other information is voluntary (the encoding of assets or economic and management follow-up); both are very important for the proper management of a Real Estate portfolio and its exploitation.

We need to define what information is fundamental and necessary, which consequently will be introduced in digital form in the computer management system.

13.3.1. General requirements

The minimum requirements on which the information system is structured are the following.

Manageability: procedures and instructions for use and testing the proper operation of the system.

Data availability: guarantee of access and use of data at all stages of system management.

Upgradability: possibility of extension and modification of the system in terms of structure, instruments and types of data for adapting to new requirements and/or new management situations.

Integration: possibilities of interaction with information and processes operated by computer systems dedicated to other areas of operations and ability to manage and correlate data stored in different formats: text, graphic, photo, audio and video.

Consistency: to maintain quality and reliable information as a result of the update task.

Safety: supplied procedures to protect data integrity and to manage controlled access to information.

In addition to the definition of minimum requirements, it is necessary to pay attention to the typical considerations related to the information system implementation:

- purpose and main objectives (defined by corporate strategy);
- creation of access profiles and authorization levels;
- level of accuracy and detail of the information;
- frequency with which the information is used and updated;
- computer update responsibilities;
- definition of the main indexes and keywords used;
- necessary hardware and software.

13.3.2. Systems applicability

The applicability is subject to available resources and depends largely on the context in which the system is implemented: the investment required for the creation and development of information systems are certainly consistent both in terms of human resources both in terms of economic resources. It is therefore necessary to articulate the development and implementation of the system through a gradual process, involving different areas of the organization through progressive growth criteria and committing the resources becoming available.

Radically different situations can occur if the information systems are applied to construction of new buildings, or Real Estate assets that were built for a long time.

In the first case, the information obtained correspond with those in the architectural and executive project, possibly aligned with the actual situation (as built) and updated. In the case of existing building and structured for a long time, it is more difficult to obtain detailed information; then the applicability of Information Systems can be dividing in different operating phases, which also define partial sections of the information collection, supported by appropriate actions of census and data collection.

In general, the information systems for the management of Real Estate assets can be applied: to different types and intended uses; to different sizes and locations; to different management and operational structures.

13.3.3. Type of information and modalities of aggregation

Usable data from Real Estate information systems belong to different types and can be divided as follows:

- alphanumeric information: derived from office automation applications such as word processors, spreadsheets, presentation sheets (formats are txt, doc, xls, ppt);
- vector information: derived from application CAD Computer Aided Drafting (the formats are dwg, dxf, etc.);
- multimedia data: audio, video and photos to help you visually understand the objects described above (the typical formats are bmp, tiff, jpeg, avi, mpg, mp3, etc.).

There are different methods of data aggregation that allow to implement the link between graphic documentation and alphanumeric information; they must be understood the existing and substantial differences.

1. The Information System uses only alphanumeric data and does not handle other formats (CAD drawings and raster images); only the data in the printed documentation that have been merged within the system by operators are usable; the system is based entirely on the archive that contains paper documents and drawings.
2. The system uses information both graphics (vector and images) and digital alphanumeric filing them in parallel, but substantially without cross-integrations and usable only by proprietary applications.
3. The system uses both graphic and alphanumeric information, connected and integrated into a single database and allows for interactivity and research by acting on both categories - for example, by making data changes on the linked drawings are updated.

13.3.4. Property archive definition

Buildings may be considered as elements that generate a considerable number of information often heterogeneous; to put them in an information system is necessary to have clarity of organizational and operational requirements processes.

The level and depth of the information inserted in the system depends on the size and complexity of the real estate assets; the information is structured in accordance with the aims and objectives that have been set by strategies; the tools are realized with the use of means and resources through the daily use of available functionalites.

Given the complexity and heterogeneous data form, it must be analytically set the information classification, cataloging and organizing data for homogeneous areas; the classification is generated from the census of Real Estate, building by building, and can resume the following:

– building area;
– plant area;
– economic and financial area;
– cadastral area;
– administrative area;
– functional area.

The available and usable information is then conveyed, according to UNI 10951 (italian guideline), in the various registers which are the basic elements of knowledge and necessary for the establishment of a computer database relating to Real Estate assets, which provides precise information and details on the consistency and the state maintenance of the buildings:

– identification registry;
– functional registry;
– technical registry;
– administrative registry.

The main registry basically consists of general information and locational type, flanked by other registries that contain specific functional information, administrative and technical matters concerning Real Estate. The various data must relate to each other and, through appropriate automatic procedures, they will always have to be aligned in the contents; this information represent the basic knowledge necessary to understand the history of the properties.

It is necessary to establish the main relationships between the various registers and the information they contain, as well as establish appropriate approval and validation processes; basic procedures regarding the processing of data and documents must be also defined.

In addition to the main master data, the information systems can often be also linked to other support files that provide useful information for the performance of activities (such as price lists, supplier list, intervention procedures), or turn to external files or from different organizations (such as land registry, tax office, etc.).

13.3.4.1. Users profiles and procedures

It must be defined the structure of the system in terms of technology and which components are required for the management of technical and operational activities.

Systems are structured to meet the technical demands; incoming information can get through technologically advanced tools such as call centers or web space that oversees both the planned activities both intervention requests, such as a failure, through a specific fault signal generated by authorized users.

Together with the definition of the system architecture and contents of the Information System data, a series of procedures that can describe hierarchies, roles and responsibilities in the use of the Information System is also set up, as well as the levels to access the information.

The allocation of specific profiles allows to maintain control over various operations; in fact, it can be determined what level of visibility is given to a specific figure. For example, the system administrator will have a high-level profile which enables the creation, access and any update, allowing to make major changes in the database; on the contrary, the

profiles involved in the execution of Real Estate measures will take charge of the work to be performed and enter return information, concerning the execution of the work and the materials/products used.

For buildings users, the management of the system should be previously defined with structured procedures; they must make available all information necessary for the course of business activities and the eventual resolution of problems encountered with the use of simple tools and easy to understand.

The procedures define, clearly and without possible misinterpretation, the steps necessary to perform a particular task, or to be made in the event that happens a stated event; such procedures are defined consistently with corporate strategies and management policies applied to Real Estate.

A specific figure (typically a system administrator) must also be found which, even through a technical structure in charge, performs the following tasks:

- define and implement the system policies (access criteria, implementation, monitoring, etc.);
- develop gradually, expand, adapt, update the system on the basis of new identified needs;
- handle the maintenance of the system.

As part of property companies and/or Real Estate, asset managers and users, depending on the role played within the organization (operational, technical, strategic, etc.), must be able to act according to different access levels and areas, in term of responsibility and autonomy, in relation to their job description, for consulting and data processing.

Therefore it is necessary to set up:

- levels and methods of introduction and updating of information;
- levels and methods of activation of the processing;
- methods of acquisition and normalization of data from external sources;
- methods of operation and system updating;
- rules and the criteria for the proper use of the system.

The procedures can be traced and made compatible with the quality system of the company, thus extending the applicability of corporate quality plans to Information Systems.

13.3.4.2. Available functions

Usually softwares are offered in packages or modules: there are basic packages (central or horizontal modules) that perform the basic functions

and make the principal instruments available; the application modules are developed vertically with specific and defined functions (see description below), additional modules add functionality to the core modules (such as web interfaces, or for data mining systems from the archives).

This feature makes possible the use of the Real Estate Information Systems in a progressive manner and distributed over time, allowing to expand the functionalites and applications according to the requirements.

The main specific functions available can be summarized by referring to the most popular modules and organized for homogeneous areas:

Tab. 13.1 – *Le principali funzioni specifiche divise per moduli*

Real estate archive
Collection of census information System update management Real estate registry management Archives management External Storage Management
Maintenance
Preparation of maintenance plan Planning and scheduling of maintenance activities Operational management Monitoring the state of repairs Intervention requests management Intervention management (requests, work orders, closure) Management of operational documents
Space management
Allocation and use management Use planning Furniture and equipment Networks and telecommunications Removals and handling Using shared spaces
Services
Security services Reception Cleaning
Energy
Remote control Remote diagnostic Energy management

Tab. 13.1 – *segue*

Management control
Economic management of activities
Supply management and procurement contracts
Breakdown of costs
Probabilistic estimates
Monitoring and control
Reporting production
Statistical processing
Communication
Internal document sharing and processing
Web space and online interfaces
Tools for managing contacts and feedback information (CRM)

13.3.4.3. Data interoperability

The dynamic exchange of information between different applications allows to have always available all the specifications and the data generated by the conduction of activities and property management. In fact, the full integration with office automation applications (MS Office applications such as word processors, spreadsheets, etc.), allows the use of Real Estate data contained in the archive, in successive stages and independently of the type of system that has generated information.

This feature is a value added and provides full compatibility of data generated and makes them usable without necessarily resorting to intermediate systems for data migration.

13.3.4.4. Interfacing with other systems

The Information System must be able to exchange information with other systems and/or sources, in case of managerial and organizational needs.

In order to allow this, it must be possible to foresee the use of standard formats (or arranged) data interchange. The use of such standard (already provided, for example, in the Public Administration) allows the interaction between information systems, reducing time and errors and the realization of process automation and immediate availability of the data in a structured format.

The information transmitted to other systems must be validated through the use of electronic signatures to guarantee the authenticity.

14 *Facility Condition Assessment* and Facility Management

Most facility managers know their buildings and their suppliers, but one of the main difficulties is to direct and program interventions, classified in current expenditure and investmenti in term of account, in a medium-term time horizon, according to objective criteria. This need of planning assumes a level of knowledge of the Real Estate conditions, capable of adequately supporting the decisions, which occurs very rarely.

The *Facility Condition Assessment* (FCA) is an analysis to determine what, in a building portfolio, needs to be replaced, repaired or modified. Provides the information framework on the various systems and components supporting the elaboration of a comprehensive plan of intervention, based on actual conditions, verified during the analysis (of course you should carefully determine the level of detail and on which systems and components this check should be carried out).

FCA could be considered as a «support to the measurement of the state of the analyzed elements and assignment of priorities regarding action on assets based on their attributed level of importance, considering the core business of the company»[1].

It is a powerful tool, useful for strategic investment planning, defining the strategic priorities of a project.

Until some time ago, the FCA systems were mainly static tools, used to collect information about the structural deficiencies in order to complete the backlog of maintenance work. Little room was left to data projections about the life cycle and the integration of information generated with other systems and technology adopted by the Facility Management, in particular the CMMS (*Computerized Maintenance Management System*) or CAFM (*Computer Aided Facility Management*) and software typically used to manage the project.

1. Harvey H.K. (2009), *Facilities Condition Assessment*, APPA, Alexandria, Virginia.

Currently, thanks to the features available in many systems that support dynamic management of corporate facilities, it can be taken advantage of the FCA beyond the simple collection and static data storage.

The Facility Condition Assessment has its roots in the traditional methodology of Facility Audit[2], born in the '70s in the US, with the aim of evaluating the physical conditions and functional performance of a building and its various systems and components; a methodology that allowed to quantify the size and the cost of corrective maintenance.

This methodology was later transformed and enriched, by associating qualitative considerations relating to the conditions of the housing stock, thanks to the identification of specific gaps and, above all, the quantification of the costs to correct them.

Harvey H. Kaiser, co-author of the book "Facilities Audit Workbook," has documented this new approach in "The Facilities Audit: A Process for Improving Facilities Conditions" published by APPA in 1993.

The conditions of Real Estate assets, however, are often complex to be measured and the cost of repair or restoration is not always detectable. Generally, the conservative state of Real Estate and plants and the related costs (renovations, preventive maintenance, corrective maintenance, repair) are difficult to be quantified. Moreover, the poor quality of information held by those who have to manage and decide on the priorities to be followed, involves the fact that the current expenditure and investment are influenced more by their historical trend that the actual needs of properties.

Through the FCA is possible to structure and articulate proposals for action on the basis of objective indicators, supporting decision makers in the proper allocation of costs, in relation to business strategies and goals.

In particular, the information gathered through the FCA can be used to:

- determine the status of facilities and building systems;
- determine the general condition of systems, to consider how to start by measuring improvements and progress;
- assess, on the basis of technical and economic criteria, the repair, replacement or abandonment.

2. Il lavoro di diffusione di questa tecnica è riassunto in: Harvey H.K. (1982), *Facilities Audit Workbook: A Self-Evaluation Process for Higher Education*, APPA, Washington D.C.

14.1. Facility Condition Assessment: methodology application

The *Facility Condition Assessment Procedure* (FCA) is the same of the *Building Condition Assessment* (BCA), however the different type of audits leads to different results.

In fact, while the BCA evaluates the condition of the property for priority intervention and aims to determine what action to take to improve their conservation status, the FCA makes an analysis that identifies, in addition to the corrective measures to be made, even costs of replacement/ repair.

The FCA therefore seeks to identify the corrective actions deemed necessary to repair and/or replace the items in question, before the anomalies escalate in a definitive way. The determination of the potential costs is, therefore, a fundamental prerogative of the FCA as well as an integral part of the assets conditions assessment.

Once recorded all the information collected on the field and processed by identifying the conservative and functional status of the assets, it can be determined the critical areas to which address any improvement measures.

The indicator synthetically representing the conditions of the Real Estate assets according to the *Facility Condition Assessment* is the *Facility Condition Index (FCI).*

14.2. A cost indicator: *Facility Condition Index*

The *Facility Condition Index* (FCI) is an indicator characterizing the state of repair of the systems assessed.

This indicator has been used as an index for determining the condition of the buildings, in the early ’90s, by the National Association of College and University in the Usa, quickly becoming the standard used by educational institutions in North America.

Recently the index has been adopted by the Federal Real Property Council, the American Public Work Association, the Council of Ontario Universities, the Federation of Canadian Authorities and several other institutions involved in the health, social housing and public works in throughout North America.

The indicator is the ratio between the cost of repair and the replacement cost of an asset:

$$FCI = \frac{\text{Repair/maintenance cost}}{\text{Replacement cost}}$$

Used to describe briefly the status of a building, a group of buildings or an entire Real Estate portfolio, regardless of intended use, location or market value, the FCI provides an idea about the state of conservation and the status of the elements.

The scale can be effectively represented as follows:

Fig. 14.1 – *The FCI scale*

The possibility of reading the FCP are varied, but, in fact, this index is the numerical indication of the distance between the situation analyzed and the ideal one, characterized by the building or various components perfect functioning.

The FCI is better the more its value tends to 0.

A new building will be FCI = 0; the more the FCI value will approach 1, the worse the state of conservation of the property or element.

The rating scale can be summarized as follows:

Tab. 14.1 – *Scala di valutazione dei livelli di FCI*

FCI levels	*Impact on the building and its components*
Chritical (> 0,30)	Deterioration of the facilities. Frequent breakdowns and / or shutdown of plants. High management risk. High risk for health and safety.
Poor (0,11 a 0,30)	Visible and growing deterioration of the facilities. Likely failure of the equipment and components. Occasional work plants stop.
Acceptable (0,06 a 0,10)	The plants show some signs of deterioration and wear. Occasional failures of equipment and components.
Good (0 a 0,05)	Systems are working and in good aspect. Limited and easily solvable faults.

Building (or installation) with a recovery cost of € 2 million and a replacement cost of 180,000 €, will have a FCI of 0.09 (9%) and therefore its condition is to be considered acceptable.

The objective is to minimize the FCP or, at least, to understand the causes that determine a high value of the index and take the right intervention strategies.

If the Fund's value increases, it should be expected:

– an increase in the risk of failure of a component;
– an increase in operating costs related to the maintenance of the facilities;
– a negative impact on users (employees and / or residents);
– an increase in complaints.

There are several systems combining the Condition Assessment analysis with CAFM (Computer Aided Facility Management) software, enabling access to all information related to capital assets through an integrated alphanumeric and graphic database system.

An efficient organization of technological systems and working environments allows an optimization of the management in terms of quality (comfort, safety, sustainability) and quantity (efficiency, costs). In this way, owners or asset managers may take decisions in relation to business needs or market conditions, effectively pursuing objectives of reducing costs and improving service management.

The data of the FCA, if properly planned and executed, jointly used with the CAFM / CMMS, can be a powerful tool for planning at different levels.

The key points in the process are:

– identification of the estimated costs of replacement, associated to services and various building systems to identify opportunities;
– identification of potential issues, problems and costs for the building;
– information management.

Regarding the methodology, the evaluation process should include several phases.

1. *Planning*: definition of the objectives and the strategy to follow.
2. *Rating*: execution of the evaluation of services and facilities, to highlight the physical and functional condition and the problems/ opportunities, (documented by photographs and drawings); execution of an estimate of costs associated with the recovery.
3. *Analysis*: calculation of the FCI and the CI for each building/service; analytical development on the basis of the data collected, and the

creation of alternative plans of action; comparing results with objectives and budgets.

4. *Execution*: execution of the plan drawn up to overcome the difficulties; continuous updating of the FCI and CI indices; feedback to improve the process.

Starting from the logic framework introduced by the FCI, they can be other types of indicators in the management of a property portfolio; they are all geared to support decisions to intervene in accordance with criteria of opportunity.

EFCI: Extended Facility Condition Index

$$\text{EFCI} = \frac{\begin{array}{c}\text{Repair/maintenance cost}\\ \text{Future renewals}\end{array}}{\text{Building reproduction}}$$

FNI: Facility Needs Index

$$\text{EFCI} = \frac{\begin{array}{c}\text{Repair/maintenance cost}\\ \text{Future renewals}\\ \text{Energy renewals}\\ \text{Regulatory compliance}\\ \text{Other upgrade and adaptations}\end{array}}{\text{Building reproduction}}$$

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