

HOUSING FACILITIES MANAGEMENT IN THE REPUBLIC OF SERBIA FROM THE ASPECT OF ENERGY EFFICIENCY IMPROVEMENT *

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Abstract. *Housing facilities management is a term which has been evolving in its contemporary sense in the territory of Serbia since the mid 90's of the previous century. Apart from such a long tradition, it encounters a problem of its insufficiently precise definition in the standing legal regulations, inexistence of an efficient system of implementation by the legally obliged persons, and the unsystematic character of regulations pertaining to this matter. Key deficiency of the existing norms is obvious in four main segments: routine maintenance, management in unforeseeable emergency situations, facility capital maintenance management and energy efficiency management. Until new acts have been adopted, many obligations of the facilities owners, which should be legal obligations that need to be implemented, represent only a moral obligation.*

Key words: *housing facilities management, energy efficiency.*

1. INTRODUCTION

Housing facilities management is a generic term including a set of activities which can provide – to the owner or user of the facility and the property – efficient management, retention or increase of market value of the property, more efficient working process, improvement and enhancement of the working area and environment, and the set of activities suitable for environment protection, and what is most interesting to the owners and employees, increase of profit and improvement of living standard [1].

Facility Management includes all the operations related to maintenance of facilities and their parts, in functional terms. Management of facilities, that is housing buildings, as

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a most widespread type of high-rise structures in the Republic of Serbia, in terms of the Act on maintenance of housing buildings [2], is taking care of maintenance of housing building as a whole and common parts in the building, decision making about provision and usage of finances for maintenances, then about the function of the common parts of the building and about other issues relevant for housing building maintenance.

The most common problems are those that include regular maintenance of all parts and equipment of a building (technical maintenance, routine maintenance), income generation for the foreseeable costs, adequate insurance property (real estate), compliance with a number of current legislation, especially in regard of public buildings, etc. Also, management, in addition to regular maintenance, comprises management in situations of serious damage, then in situations of major repairs, necessary upgrades and facility upgrades, and installed systems (capital maintenance). Energy efficiency management has a special place in facility management, given the economic impact it has on the cost of operation over the service life of facilities. Determining the exact boundaries of individual segments of facility management is very difficult, but proved to be very necessary in practice. Problematical are numerous situations that have no resolution in positive legislations, as well as insufficiently precise formulations, and unsystematic character of regulations governing this matter.

2. SERVICE PHASE MANAGEMENT

The service life of a facility depends on the structure itself, but also on the level of maintenance, that is, of management skills. Appropriate management includes timely identification and effective and urgent removal of defects at an early stage. In this way the level of use of the facility is better and maintenance is more economical.

Damage that may occur while using the facility often affects the interior of the building, the comfort it provides, structure, size and interconnections of the rooms are viewed in relation to the safety of the building, structural strengths, seismic activity, etc., and belongs to the group of functional damage. The second group is so called esthetic damage to which belongs all damage related to the visual appearance of the interior and exterior and the surrounding property. Finally, all those defects which relate to fire protection, ventilation, air conditioning, video surveillance and the like are considered technological damage.

If a basic criterion for division is “urgency of intervention”, the multitude of possible divisions is possible, by applying additional criteria, and so damage can be divided by the rate of emergence (gradual and instantaneous), the extent and severity (risk), manifestation (visible, hidden, predictable), type, features and economic feasibility of rehabilitation, the causes and the time when the damage occurred, the elements to which the damage occurred, and others; these divisions are important bearing in mind the owner’s liabilities with regard to the type of damage. Obligations of rehabilitation of certain damages are set out in cogent legal norms while others apply to dispositive legal norms. Also, there is an unusually large range of damages of a facility the owner may, but need not remove because this kind of damage is not an immediate threat to life and health of people and material goods.

For this reason, in certain countries, facility management is regulated by imperative legal norms, according to the elaborate classification of damage (facility damage with re-

gard to the degree of damage) [3]. For example in Germany damages are classified by remediation potential, structure service life, the severity and extent of load, etc.. In France, the obligations of the owners are defined by the impact on aesthetics, durability and stability of the building. These approaches include mandatory periodic inspections of facilities by authorized institutions which on the basis of the performed examination form a report and propose measures - if they are necessary for the unimpaired functioning of the facility. Thus, according to the Model Code Euro-International Committee for concrete [4], the recommended time between the two detailed inspections cannot be longer than 10 years. In Japan, for example, inspections are divided into control (every several months or after adverse weather conditions), periodic (between 1 and 5 years) and special examinations (which are performed after natural and man-made disasters).

Given that in Serbia there is no clearly established system of facility control inspections, it is considered in our literature that the building control inspection should include the following [5]: general and local control of structural resistance, control of the spatial rigidity and deformation, foundations control, subterranean parts, hydro, and moisture insulation; control of roofs, balconies and gutters, control of sanitary devices and all existing installations, control of the stairs, elevators, loggia and terraces. A special segment of control is the control of thermal properties of the facade as well as control of joints around windows and doors on the facade panels - an energy efficiency control. Therefore, such a lack of interest of the legislator left to the property owners to take care of the frequency of controls, is considered not to be in the best interest of the community.

Furthermore, the question is what to do after performed controls? It is necessary to have normative values for comparison. Also, it is necessary to compare the obtained values with the previous values. The degree of the routine maintenance is determined according to the obtained values. Such preventive controls are performed in order to find possible defects and facilitate their timely remediation. It is necessary to examine in detail all the results from the present situation and predict possible interdependence damage. Only after this is the plan for routine maintenance implemented. Works on routine maintenance of common areas of housing include a series of procedures to be performed to ensure the sustainable facility operation [6].

Facility management is not limited solely to the removal of found "errors". Quite the contrary. Damage to the structure that occurs during the regular service can be predicted in a vast number of cases, therefore planned for. It is necessary to arrange their timely repair and manage the necessary tasks. Finally, it is necessary to inspect the executed works and provide at least the same if not longer service life.

3. MANAGEMENT IN UNFORESEEABLE EMERGENCY SITUATIONS

It is known that certain situations cannot be fully predicted or observed during design. It is possible that certain defects in the building can cause unserviceability of the whole building or a part of it, and thereby cause a considerable damage.

Planning of measures to rapidly prevent the further deterioration of the building and of the measures to eliminate the damage caused is one of the basic functions of the facility management. When planning the measures one should take into account that the deficiencies may require long period of time and considerable investment for elimination. Unfore-

seen disasters usually occur on the roofs and walls of the structure, however they are possible in all other parts (chimneys, ventilation systems, lightning rod assembly, etc.). The places where the most of roof damage occurs mainly are: at the joint of roof tiles or of the roof with another surface, then damage to the roof cover itself, damages near the flat roof drains and at locations of penetrations through the roof, for instance around the chimney, windows, antennae, etc. It has been proven in practice that the defects caused by the sporadic penetration through the roof and near gutters, are dealt with locally, while for the remediation of multiple deficiencies it is more appropriate to do a detailed repair which is far more durable, but also financially demanding.

It is necessary to plan, organize, and take all measures to maintain the roof in serviceable condition, therefore take the measures that are not a remediation. This is primarily cleaning of metal parts of the roof drainage and gutters.

Repair of the roof should be performed meticulously and completely. The roof is part of a facility that protects the whole building from deterioration, and when it is not fully operational, the facility is at risk of damage under the influence of atmospheric conditions. However, in case of uncompleted building or facility that has not yet been put into operation, or facility, which needs changing of the whole roof for any reason, or for other justified reasons, roof repairs can be delayed.

Masonry, as the most widespread in our country, as well as other types of facilities are also subject to damage under the influence of atmospheric conditions. Over the years they are exposed to different weather conditions: adverse effects of sunlight, winds, frost, rainfall and many others, which can lead to onset of moisture. The most important is to timely prevent the adverse effects depending on several factors. This is most successfully achieved by maintaining the facade and applying the adequate materials (different cements, coatings, impregnation, cladding...). This type of repair also may not be urgent, but it is in the interest of investors to undertake it as soon as possible in order to prevent or at least retard the appearance of the new damage.

Another common damage is cracks in the walls of the structure. Fissures and cracks can radiate in all directions, and they appear in the plaster or brick. They can be of different sizes and generally occur due to construction settlement and due to the use of low quality materials in construction, but also because of other factors, such as earthquakes, or similar accidents such as floods, because of nearby vegetation, and so on. The most important thing is that if there is such a case, the cause should be identified and an adequate repair of the walls performed. It is usually necessary to increase the bearing capacity of the wall itself, which is achieved by incorporating horizontal and vertical ring beams of reinforced concrete, and if this is impossible, then the vertical reinforcement with wire mesh should be constructed [5]. It is possible, in addition to the above, to use many other methods such as adding reinforcement and increasing the wall thickness by using concrete, applying carbon strips (the latest method) and others. This kind of maintenance is certainly necessary, but it is a matter of judgment whether it is necessary to react in a very short period of time, or the remediation, according to the status, can be done at some future time. It is certainly in the interest of investors and owners to remove the damage to the facilities in the shortest possible time, however, there are facilities throughout Serbia, and not only disused ones, but also those which are in regular use, whose owners neither exercise the status control nor repair the damage of their facilities.

4. FACILITY CAPITAL MAINTENANCE MANAGEMENT

Capital maintenance of facilities comprises execution of construction and specialists trades works depending on the type of the structure in order to improve the conditions of the facility use during service. Types of works in residential buildings that belong to this category were regulated by the law [7].

Capital maintenance management includes maintenance planning, organizing, management and controlling of the works undertaken in order to improve the conditions of use of the facility. It is the responsibility of the housing Assembly to issue a decision, or a program that specifically identifies: capital and routine maintenance of the common parts of the housing that will be performed in the current year, the priority of works, dates of execution of works during the year and an estimate of required resources [8]. The main issue of the capital management is at what point should the planned maintenance be implemented and to what extent? In this sense we distinguish between voluntary and necessary maintenance. The voluntary is that performed by the investor regardless of the degree of impairment of the facility functioning. Necessary maintenance is performed when the degree of deterioration is such that the maintenance of the facility must be undertaken without delay. What is the serviceability of the facility, may, therefore, be accurately expressed by the degree of deterioration (S), which is expressed by the percentage of deterioration (mean deterioration of all key elements) [5]. Thus, if the value of the degree of deterioration ranges between 0 and 15% it is considered that the serviceability of the facility is fully preserved and does not require additional investments (which does not exclude voluntary investment or capital maintenance). Values of degrees between 15 and 30% (serviceability is good, usability is provided) and 30 and 45% (satisfactory condition with defects, cracks and deformations within the permissible limits), also do not involve additional costs but are the basis for planning capital maintenance which will be needed in a very short time. Values between 45 and 60% (the situation is unsatisfactory and usability is partially disrupted) or above 60% (emergency status), imply that the building is not safe to use, or that the capital maintenance is necessary.

While managing the capital maintenance process, it should be noted that certain elements of the building do not have an equal service life, so though it may not be necessary, it may be appropriate, to include work on these parts in the plan. So depending on the service life of the individual elements of the structures, elements can be divided into: elements with long durability – coinciding with the durability of the building itself (supporting elements: foundation, walls, floor slabs), elements with the durability lower than the service life of the building (floorings, doors and windows, inner and outer linings, installation...), elements with very low durability (some flooring, finishes, sanitary ware, parts of the installation...) [9]. As set forth in their classification, capital maintenance management can be comprehensive and partial. A comprehensive maintenance includes elements of unequal service life, regardless of whether their capital maintenance is necessary or not. Partial maintenance covers only essential capital maintenance, therefore, only considering the parts whose renewal is necessary.

Necessary capital maintenance may be necessary to remedy damage to the facility, which has already been discussed, but also to eliminate potential hazards to life and health, to achieve their safety and protect property from damage. In this regard, those are emergency interventions [10]. The instruments for the implementation of such measures,

even for those situations for which they exist, are not sufficiently effective. The goal is to insist on the application and improvement of the existing legislation.

5. ENERGY EFFICIENCY MANAGEMENT

An energy efficient building is such building consuming a minimum amount of energy, while providing the necessary comfort (thermal, air, visual and acoustic ones) [11]. Energy efficiency of a building is fully achieved if the minimum conditions of comfort are provided, and the consumption of energy for heating and cooling, hot sanitary water, ventilation and lighting does not exceed maximum values per square meter. Therefore, one of the main tasks of the building is to represent an environment which is favorable for all the activities of the users taking place in it.

Therefore, management of energy efficiency in buildings is the provision of comfort conditions by a designer had in mind during designing and that existed on the day of obtaining the use permit.

In terms of providing the designed air comfort, facility management involves planning, organizing, and maintenance control of the systems for natural ventilation, especially draft system, then maintenance of the system of forced ventilation and heat exchangers.

Considering that thermal comfort should be provided throughout the year, building management in this sense, has a broader content and includes control, damage assessment and maintenance of the cladding, installation of additional protection against solar radiation, the use of natural methods for heating/cooling, and subsequent installing of innovative systems and standards. Thus, high-rise buildings must be designed, constructed, used and maintained in a manner that provides prescribed energy performance. Prescribed energy properties are determined by the issuing of energy performance certificates issued by an authorized organization that meets the requirements for certification of energy performance of buildings, and it is to be submitted with the application for use permit [12]. The subsequent installation of innovative systems and application of new standards is in favor of, first of all investors (less consumption of thermal energy), and the community. On the other hand, the question of costs of implementing of new standards is often a key barrier to their universal acceptance.

Management of lighting comfort in the building comprises ensuring the smooth inflow of natural light and proper maintenance of artificial lighting. This function is equally shared by both the investor and the local government which is responsible for enacting and amending of spatial plans. Namely, it is essential that town planners when changing spatial plans and when making the new ones, take into account the mutual distances of structures, and the departures that have been made in relation to the previously established spatial plan. There may occur situations in which a designer has designed natural lighting conditions according to an agreed plan, while due to the subsequent alterations of the plan these conditions radically change, thus leaving some parts of the building entirely without or with less natural light. Therefore, the facilities management in this regard is equally divided between local governments, which should *ex officio* take care of the objects which have been constructed, on the one hand, and the investor which must be involved in the plan making process in the capacity of interested parties. Potential objections should be made to the designs that would jeopardize the comfort conditions.

The similar holds for acoustic comfort management.

When planning to ensure efficient use of energy in residential buildings, as a the form of facility management stage, one must take into account the designed service life of the building, changes of climatic conditions on the location, position and orientation of buildings, any change of use of entire building or certain parts of it, change of comfort conditions, materials and structural elements of the building and its envelope, dilapidation and condition of installed technical systems and devices, and energy sources and cogeneration, and the ability to use renewable energy sources [13]. Based on these parameters, it is necessary to draw up an action plan on whose basis building maintenance program for the following year will be made. We believe that the legislation that the building maintenance program is made exclusively for of for the current year is not in line with the real needs. The fact is that some interventions require significant financial resources, and it is not realistic to expect that all phases of the planned works (except those requiring immediate execution) will be performed within one calendar year.

6. CONCLUSION

Housing facilities management is a generic term which comprises performance of all the activities which would primarily provide excellent facility functionality to the owner. However, due to ignorance, lack of resources, disinterestedness or other reasons, in practice, the owners do not manage structures but leave them to the mercy of time, which leads to such situations where the buildings are damaged to the extent that they pose an immediate risk to life and health of the people and to the property.

Even though the legislation describes a certain number of situations in which the owners of buildings must react, that is, manage their buildings, there is no efficient system taking care of implementation of cogent legal norms.

Systemic solution of the issue of implementation and improvement of the legislation on management of, primarily, housing structures, which are the most frequent type of buildings on the territory of the Republic of Serbia, management of facilities in the form of a theoretical hypothetically given model based in part on the existing legislation is in the domain of a moral obligation.

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UPRAVLJANJE STAMBENIM OBJEKTIMA U REPUBLICI SRBIJI SA ASPEKTA POBOLJŠANJA ENERGETSKE EFIKASNOSTI

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Upravljanje stambenim objektima je pojam koji u svom savremenom značenju evoluirao na prostoru Republike Srbije počevši od sredine 90ih godina prošlog veka. I pored tako duge tradicije suočava se sa problemom njegovog nedovoljno preciznog definisanja važećom zakonskom regulativom, nepostojanjem efikasnog sistema primene od strane obavezanih lica, kao i nesistematičnošću propisa koji tangiraju ovu materiju. Ključni nedostaci postojećih normativa vidljivi su u četiri noseća segmenta: tekuće održavanje objekata, upravljanje u situacijama nepredviđenih havarija, upravljanje investicionim održavanjem objekata i upravljanje energetskej efikasnošću. Do usvajanja novih rešenja mnoge dužnosti vlasnika objekata, koje bi po prirodi stvari trebalo da budu zakonom utvrđene obaveze čija je primena obezbeđena, predstavljaju samo moralnu obavezu.

Ključne reči: *upravljanje stambenim objektima, energetska efikasnost*