Building refurbishment: habitat upgrading

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Abstract

Building refurbishment is often considered as a technical matter that concerns technical experts and engineers. However, every refurbishment operation modifies the human living environment. A narrow technical or financial vision can deteriorate people’s living environment, while a global approach can upgrade it to current comfort standards, ecological requirements, and optimal energy performance. EPIQR is a decision tool combining financial, technical, energy, and comfort analysis. This article exhibits the advantages of the EPIQR method as a means for a global vision of refurbishment. © 2000 Elsevier Science S.A. All rights reserved.

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1. Introduction

Building refurbishment mainly concerns physical and functional building components, but should also take into account various topics such as energy consumption, pollutant emission, and operational waste reduction as well as air quality and spatial comfort.

Numerous buildings constructed in a haste in the sixties and seventies, before the oil crisis, are great consumers of energy due to outdated heat production systems and/or insufficient insulation of the building envelope. Rehabilitation activities in these buildings often constitute an excellent opportunity for improving the energy balance and the indoor climate. Better control of the heating along with thermally improved building envelope insulation in fact result not only in energy savings, but also in improved indoor comfort. Thermal gains from passive solar energy can also considerably contribute to an improved energy balance and user comfort.

In the context of a refurbishment project, the approach chosen for the first phase is the most important. The object exists; it has to be analysed and seen as a whole for the study of potential problems and the planning of an intervention strategy [1]. This is the phase of an overall diagnosis which has to systematically include the whole building. It is the point of departure for discussions which will lead to a definition of the refurbishment project. None of the different parameters can be ignored, and there are many.

First of all, the physical state of the building elements and the functional state of the building services as well as the type of housing and its occupation have to be determined. Then, rent paid before refurbishment work and financial viability of the planned operation are also important factors in the decision-making process.

2. The role of EPIQR

EPIQR will allow architects to globally approach the refurbishment process and thus to optimally maintain the utilisation value of residential buildings. The approach of this new concept is closely tailored to the needs of architects.

EPIQR enables rapid and therefore low-cost acquisition of all the data required for a sufficiently accurate cost estimate (i.e., compatible with fluctuations noted for the building domain). The method is of value to any organisation or person who deals with the refurbishment or management of residential buildings, in particular to architects and engineers, building owner associations, housing associations, building societies, and technical consultants.

Starting with the acquisition of a complete set of data regarding the building to be studied, EPIQR allows users to:

- establish a complete description of the general state of the building;
- perform a diagnosis of the physical and functional state of the building;

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• determine in detail the nature of work to be carried out, its global and detail costs;
• optimise the energy consumption of the building after refurbishment;
• take the measures required to correct problems of air and indoor environment quality;
• compare refurbishment scenarios taking into account the gradual degradation of building elements and the cost evolution as a function of elapsed time; and
• study different retrofit possibilities.

2.1. The establishment of a diagnosis

First of all, a rough diagnosis of the building is established. Based on this evaluation of the building’s general state, EPIQR gives a first estimate of the costs of required refurbishment work. EPIQR proposes the following approach for the establishment of a diagnosis, namely:

– a systematic and complete visit of the building according to a well-defined itinerary where all building components are evaluated at sight, without a sample survey or consultation of a specialist [2],
– a complementary survey on the basis of a questionnaire (to be filled in by the building maintenance service or the tenants), and on this basis, and
– an analysis of the refurbishment options according to different scenarios, including envisaged work, costs (in detail), the foreseeable energy consumption as well as possible improvements on air quality and indoor environment comfort.

2.2. The renovation scenarios

The diagnosis established during the visit of the building constitutes a snapshot taken at a very precise moment of its life cycle. The nature of work to be done not only depends on this diagnosis, but also on the objectives of the building owner and the economic situation and therefore cannot be standardised. Consequently, it must be possible to establish different refurbishment scenarios.

The fact that the degradation report established by the diagnosis is not directly coupled to the refurbishment work proposal constitutes a fundamental aspect of the EPIQR concept. Accordingly, the EPIQR program proposes different work scenarios for every building component independent of its state of degradation. The work proposals based on standard refurbishment work can be accepted globally or analysed in detail and retained partially. In the same way, the user even has the possibility of introducing work that would not have been proposed by the method, but which is specific to the building considered.

2.3. The report

In order to coherently organise the project, the project manager will have to present a complete report to the building owners, including the building diagnosis, but also presenting different scenarios for the continuation of the operation. This report includes:

– a diagnosis of the condition of the different building elements;
– an overview of the worst deterioration problems;
– an energy balance of the building, possible improvements [3–5];
– possible improvement of the indoor air quality [6];
– the nature of refurbishment work (possible actions);
– a definition of the degree of intervention;
– the cost of refurbishment work; and
– a simulation of possible investment schemes.

The presentation of the results demands particular care. It aims at two goals: on one hand, the nonspecialist must be informed on the state of the object (point of departure of the evaluation) in a global and accessible way; on the other, the nature and scope of the proposed intervention must be quantified. Some of these data will be presented in the form of graphs in order to stress certain important points which will help the owner to decide which option to choose for the refurbishment of his property. It is clear that a graphical presentation of the results is preferable to long explanatory texts.

The indication of the global intervention costs is accompanied by a description of all the work involved. This basic information is only really useful if accompanied by a commentary indicating the probable evolution of the state of deterioration as well as the costs of refurbishment as a function of the elapsed time. This will be a really useful tool for the financial planning of building refurbishment and the choice between possible scenarios.

3. Conclusion

At the beginning of any refurbishment project, it is of paramount importance to collect all relevant information. This information generally involves various fields such as the building’s and service’s degree of deterioration, energy demand, waste management, indoor environment quality, etc.

The EPIQR method allows a rapid and comprehensive survey and report of this information acquired through visual observation and occupant interviews. Of the many possible refurbishment scenarios based on this information, it will then be possible to choose the one that best fits the general situation, the need of lowering the energy consumption, and the financial possibilities.

References


