Comparison of the HQE method and the Ev assessment

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ABSTRACT

The current environmental data and mainly the concern on the exhaustion of not renewable sources of energy dictate the need that the human activities should take place in the frame of sustainable development. Today, it can be achieved in the building sector and in general in the structured environment, via methods such as the one of ‘high environmental quality’ (démarche Haute Qualité Environnementale) and the one of Ev (Environmental Value). These methods aim at the protection of natural environment, the reduction of negative effects of building on the environment, the saving of energy and the creation of satisfactory internal environment. Their goal is to satisfy the present human needs but, at the same time, taking into consideration future generations.

1. METHOD OF HIGH ENVIRONMENTAL QUALITY

The "HQE» is the French approach of the ecological architecture that was initially formulated and supported by the members of HQE association. This association was founded in 1996 in Paris and works on the content of this method and the classification of the HQE principles since 1997. Its purpose is to develop the environmental quality of buildings.

More specifically, it concerns two big units: the control of negative influences of a building on the exterior environment and the creation of a respectively satisfactory internal environment. The HQE association creates various categories and subcategories with the following way:

1.1 Control of the negative effects on the exterior environment

- *Eco-construction*: harmonious relations between the building and its surrounding environment, careful choice of construction technologies and materials, minimum disturbance of the environment by the worksite.
- *Eco-management:* management of energy, water, building waste, maintenance.

1.2 Creation of satisfactory internal environment

- *Comfort*: hydrothermal (humidity, heat, acoustic, visual, odours-wise).
- *Health:* good conditions of hygiene, quality of air, quality of water.

The "HQE" is a "process" that seeks to include as much as urban planning programs as buildings that have to be reconstructed and also new constructions, in the prospect of sustainable development. HQE’s object is to create such conditions in order for the building to protect the natural resources, to check its influence on the exterior environment and to respond to the requirements for comfort, quality of life and health. A building that follows the HQE method must satisfy the above criteria from the first moment it is used and throughout its lifetime: starting from the stage of planning organisation during the phase of architectural conception even in case of demolition and the waste management.

2. THE 14 PRINCIPLES OF THE HQE METHOD

The HQE association formulated a method

which -as it was mentioned before- is separated in two big units and these units in 4 sub-sections which are analyzed in 14 principles. The first seven principles concern the control of the effect of a building and its management on the environment. The next seven principles concern the comfort and health of the users. Similar additional methods exist today in France as for example the methods of CSTB, Ecole des Months, ICEB, but also in other countries (England: BREEAM Building Research Establishment Environmental Assesment Method) or SEAM (Schools ' Environmental Assessment Method, I.P.A: LEED Leadership in Energy and Environmental Design)

In more details the 14 principles that form the HQE method are the following:

2.1 Unit 1: eco-construction

2.1.1 Principle 1: Harmonious relation of a building with its direct environment

The first principle includes the exploitation of possibilities that offers the landscape and its surrounding environment. The use, on the one hand, of the local services (networks of transport, potable water, energy and telecommunications) and on the other hand of region's natural resources (materials that are produced in the region, water and energy sources mainly renewable/geothermal, wind, solar energy).

Additionally, the disadvantages and the advantages of the area should determinate the first stages of planning. The following issues should be taken into consideration: the local climate (micro- climate), which of course influences the planning (for example protection from powerful winds) and the topography of the ground that plays a very significant role in the suitable placement of a building in the plot.

An important advantage is always the existing vegetation which the architect owes to maintain and to supplement. In this way he contributes in the environmental quality of a building and in the maintenance of the environmental balance. The free parts (non-constructed) of the surrounding area are preferably formed in a way that they encourage the acoustic comfort and create a pleasant ambience.

2.1.2 Principle 2: Suitable choice of building technologies and materials

The HQE method, with this principle, takes into consideration the degree of the buildings' adaptability and resistance against time. It also includes the environmental consequences of materials at their use and the trace of pathogenic characteristics. Prior to the use of any of the materials, their "life-span" should be known (natural resources'- energy's consumption during its' production, transport and placement, its' effect on human and finally its' possibility for recycling).

2.1.3 Principle 3: "Friendly" worksite to the local environment

Each building activity has serious repercussions on the environment mainly because of the accumulation of large quantities of construction's waste. The right management of these and their reduction are imposed via a process of their reuse, recycling or energy-wise exploitation.

In the frame of this principle, the noise that is caused during the building work and the unpleasant smells should be limited. The use of products that pollute air and water must be avoided.

2.2 Unit 2: House - management

2.2.1 Principle 4: Management of energy

Efforts for saving of energy have to be done mainly with regard to heating. Moreover, the reduction of energy needs concern: the use of electric appliances, the production of hot water, the lighting and air cooling. The policy of 'environmental quality' encourages the development of renewable sources of energy and the utilisation of "clean" technologies and effective energy equipment.

2.2.2 Principle 5: Water management

Water is a very important natural source which should be protected with regard to the quantity and the quality. A better management of water means saving of potable water (which becomes continuously less and more expensive), the concentration and exploitation of rain water towards secondary uses and the exploitation of the already used water. For this reason the information and the sensitization of the users are very important.

2.2.3 Principle 6: Management of litter

We should know that the litter that we produce cannot be absorbed or remain accumulated as before in places that were intended for this use. It is absolute necessary to re-exploit the litter (use as fuel material or recycling) and to use the appropriate equipment specifically adapted to achieve the management and the re-exploitation of inevitable litter. This principle is supported also by the ecological sensitization of the buildings' users in order to avoid the wastefulness.

2.2.4 Principle 7: Maintenance

The effects of the maintenance of a building on the environment should be foreseen and faced from the phase of the architectural conception. The essential products which are used for the maintenance of a building should not pollute the internal air and the technological equipment should be regulated properly. Particular attention must be paid to the mobile elements of building, such as doors, windows and solar - protective systems.

2.3 Unit 3: Comfort

The principles of "comfort" concern more the architectural composition and it includes not only the objects of bioclimatic architecture, but also what is related to the control of the internal environment. These principles are distinguished in:

2.3.1 Principle 8: Hydrothermal comfort

There are four natural factors that characterize the hydrothermal comfort: the air's temperature, the temperature of the surfaces in the room, the air's humidity and speed. These measures depend on the characteristics that the architect gives to the building and on the influence of internal systems (as for example the system of ventilation). Architectural choices that influence the degree of hydrothermal comfort are the position and the dimensions of glass surfaces, the sun protection of the openings, the choice of materials for the interior and generally the choice of the insulation material.

2.3.2 Principle 9: Acoustic comfort

The acoustic comfort is on the one hand the satisfactory hearing of various sounds that are produced in internal spaces and on the other the absence of disturbance by the exterior sounds or the sounds of building's equipment.

The acoustic insulation is necessary to protect the privacy of the inhabitants so much from the exterior noises as from those that come from the adjacent apartments. The degree of the acoustic isolation depends on the outer layer of the building, its general form, the constructive system and the materials of the internal intermediary walls.

2.3.3 Principle 10: Visual comfort

The view and the natural lighting are two elements that render more comfortable the life conditions of the users in the buildings' interior. The presence of openings facilitates the infiltration of natural light and consequently the saving of energy from the artificial lighting. However, the architect owes to pay particular attention to the openings' dimensions in relation with the volume and the colour of the interior space, their placement, their orientation and the systems of solar protection. The existence of planted spaces and also the various colours play significant role to the visual comfort of the users.

At this point, it should be mentioned the difficulty to satisfy at the same time the rules of energy's management, hydrothermal and visual comfort (all year round).

2.3.4 Principle 11: Odours-wise comfort

In order to avoid the unpleasant odours, it is important to ventilate the spaces where these sources are found and to avoid the materials that carry unpleasant smells. On the contrary, the use of plants near the building helps to gain pleasant smells and offers at the same time sun protection.

2.4 Unit 4: Health

2.4.1 Principle 12: Conditions of hygiene (sanitary conditions)

This principle concerns the hygiene of a space and the health of its users. For example, the high temperature in the interior during summertime can possibly disturb particularly the sleep and the health of residents. Humidity, dust and the existence of dangerous micro-organisms worsen also the conditions of hygiene. In order to ensure good conditions of hygiene in a building, it

is important to maintain the waste management, to find a way for reducing noise, to perform frequent ventilation and to pay special attention to the sector of the building maintenance.

2.4.2 Principle 13: Quality of air

The fact that a person spends on average the 80% of his time in the interior of a building imposes the particular attention of constructors on the quality of air. This can be achieved on the one hand, by the restriction or the exclusion of the construction materials that contain harmful substances (for example asbestos, toxic metals or materials of high radioactivity. On the other hand, to achieve a good quality of air in the interior, the frequent cleaning of buildings and the good ventilation are imposed.

It is obvious that simultaneously it should be taken into consideration the quality of exterior air which influences directly the internal air. This involves careful study of the environmental data of each region and mainly of the ground.

2.4.3 Principle 14: Quality of water

The quality of water can be achieved by the protection of water network, the improvement and maintenance of water's quality in the buildings, the careful management of not potable water and the networks that supply it.

3. THE ENVIRONMENTAL VALUE EV

The Ev method was formulated and presented for the first time in 1997 by Dr Panos Kosmopoulos. Since then it has been developed and today constitutes a complete method and a very useful tool for the environmental design. It was initially published in his book 'Introduction to the environmental design'. In that book, he analyzes a process which, on the one hand, can help the researcher to take into account all the phases of a project (design, selection of materials, construction, function, end of use) and to handle it according to the general principles of environmental design. On the other hand, this process constitutes, at the same time, an important tool in order to control and evaluate the degree of environmental quality of existing constructions. This evaluation includes the estimation of different factors that concern also all the phases of planning and construction.

The Ev, as the HQE method do, concerns the control and the reduction of negative effects of building on the environment and the creation of a satisfactory internal environment. However, the Ev includes two more important parameters that HQE does not take into consideration: the aesthetical and the social value. It is important to point out that the Ev process is being continuously developed and until this moment it has been applied on many different constructions, in the frame of the Laboratory of Environmental and Humane Design at Democritus University of Thrace.

The Ev proposal

The Ev process that Dr Panos Kosmopoulos proposes and presents, (Kosmopoulos, 2001) helps in the approach of issues involved in the man-made environment. His proposal is formulated in a very different way from the HQE method, despite the fact that both of them concern many similar principles. In my opinion, the Ev is a clearer and more specific process because of its structure. At the beginning, it takes into consideration three important factors that have to be satisfied by each construction: a) Environmental Value, Ev b) Functional Value, Fv and c) Aesthetical Value, Av. At a later part of the process, the most important of all the Values the Ev one, has to be taken into account, analyzed and controlled for all the project phases

(Project phase, functional phase, end of use phase). As Dr Kosmopoulos points out: "…as for the Environmental Value, approaching each project the following flow should be taken in account: INPUT-FUNCTION-OUTPUT. Therefore, our evaluation should include the estimate of factors that concern all three parts of project" (Kosmopoulos, 2001). More specifically, the whole process is presented on the matrix of environmental assessment below, which concerns the application on a contemporary residence building.

4. THE ROLE OF THE ARCHITECT

The role of the architect or any other person in charge of a construction is very important for the success of each method's application concerning the environmental quality. This success depends on the will of each responsible team to include, from the beginning of the project, the interest for the satisfaction of the factor "envi-

Table 1: Matrix of environmental assessment.

Environmental Value Ev						**Functional evaluation**		**Aesthetical evaluation**	
Project Phase		Functional Phase		End of use phase		Functional Value	Fv	Aesthetic Value	Aev
Minor alteration/ intervention in the local environment	4	Full independence resulting from the design and the use of renewable resources	4 -	Possibility to re-incorporate materials/ elements in the natural environment	4	Main users’ degree of satisfaction	3	Main users’ degree of satisfaction	2
Selection of building materials	4	Partial use of renewable resources	-	Possibility to reuse materials	3	Specific users’ degree of satisfaction	3	Main users’ and visitors’ degree of aesthetical satisfaction	2
Energy for the manufacture of building materials	4	Use of local, natural energy sources, found in the area	-	Possibility to recycle materials in low cost	3	Visitors’ degree of satisfaction	3	Aesthetical satisfaction at view	2
Material transportation	4	Use of local energy sources (e.g. gazers, wood)	-	Stopping of poisonous emissions/ rejections from materials used.	2	The fact that the building does not limit the degree of satisfaction of other persons even if they are not common users (e.g. neighbors)	3	Degree of satisfaction of the social environment	2
Energy for the construction phase	4	Use of waterpower (hydroelectric)	-			Local and broader area satisfaction.	3	Degree of satisfaction at a broader level (TV, photos etc)	3
Reuse of an already existing shelter	-	Maintenance cost	3						
Use of recycled materials	4	Preservation of the surrounding area (tree-planting etc).	3						
Use of conventional materials	4	Use of energy by exhausted resources found at a distance and polluting during their production and/ or consumption.	4						
Re-formation of the surrounding area	3	Use of electricity from dams or by polluting combustion	4						
Use of very expensive and rare materials	2	Operating life of shelter and possibility to re-use it without great cost	3						
Poisonous emissions/ material rejections	4	Poisonous emissions/ rejections during function	3						

$f = E\,v + F\,v + A\,e\,v$ (Kosmopoulos, 2001)

ronmental value”, as much in early stages as in the later phases of conception, realisation and use of the project. In conclusion, it is the duty of each person in charge of a project to initially sensitise and to coordinate the other members of the project team. He is the one who will determine the objects of priority with regard to the method of environmental quality HQE or to the process of Ev accordingly. The degree of satisfaction of each environmental principle should be combined with the rest of the principles and the program that will be applied should be compatible with the environmental choices together with the financial data.

Above all we should not be restricted by the principles of each method and try to apply them strictly. In each project we owe to respect, to a certain extent, the total of principles, while at the same time observing the existing legislation and using the existing practices.

5. CONCLUSION

In conclusion, we could say that there is important equivalence between the method of environmental quality HQE and the Ev Matrix process. Both of them aim at the protection of natural resources, to the saving of energy and to the comfort of users in the interior. They can be applied in all types of buildings, new or already existing buildings, private or public, residences or buildings which belong in the tertiary sector. Both of them also concern the life-span of a building, starting from the stage of planning organisation during the phase of architectural conception even in case of demolition and the waste management. However, in order to achieve a total evaluation of a project, the environmental factor is not sufficient. The aesthetical and social values which are included in the Ev process– although they are difficult to approach- are

very important.

It should be mentioned that the method of high environmental quality is an actual process that is applied in France and developed, as much as it is possible, in given time and at a given place with the available technologies. Certainly, it is a simple method where there are no obligatory engagements. Each constructor can apply it initially little by little and approach it progressively with the help of the specialists.

On the other hand, the Ev Matrix process has applications–until now- on many constructions but only on existing ones and certainly on a theoretical level. That is justified because of the absence of the appropriate legislation in Greece.

To conclude, the question of maintenance of planet’s natural resources and the quality of environmental conditions, as much as in the interior as in the exterior environment of a building, are considered extremely important. Therefore, we think of the Ev Matrix process- concerning Greece- as a useful tool or as a point of reference which will serve these purposes and will allow us to seek a better quality of life in structured or unstructured environment, especially concerning the much expected application of the KOXEE (Greek regulation for the rational energy use and energy conservation in buildings).

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