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The Environmental Quality of Products and the Technological Choice

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The classification of construction elements in accordance with an essentially object-based logic, suggested by construction habits and a subsequent tight relation between functional elements and technologies for execution, is now outdated, even if its logic of communication is still used for some groups of elements. It was replaced by the logic of performance, where the supply of performance for satisfying needs comes before the material definition. Obviously the object description is not outdated owing to its basic role in the formal control of the object, but sometimes the logic of performance prevails, as it is more suitable to create innovative solutions, or just cheaper solutions, in order to solve problems where the conformity with prescriptive minimum standards stands out among other needs.

So the classification into constructive elements was replaced by a system of classification (I'm referring in particular to what Italian UNI prescriptions define, but essentially this classification mirrors a peculiar way to conceive buildings) which offers the technological system broken into classes of performance (classes of technological units, technological units, classes of technical elements). In fact even this kind of classification cannot get rid completely of object-based references; even though some technological units consistently start with the logic of performance (closings, inner partitions), others do not, and they are shown as parts referring to predictable elements (eg. services supply systems).

At any rate, in the end, you get to the technical elements, which are depicted quite traditionally. After all, the so-called "analogous solutions", that is technological solutions made up of descriptive elements based on the logic of performance, refer to familiar and preconstituted constructive modalities. On the whole, the difference between the main concept and operative result does not bother much, as in planning, the attempts to break up connections among form-fuction-element seem to have had transitory results (from deconstructivism onwards), limited anyhow to the world of formal experimentation, clashing with the insurmountable problem of the force of gravity and the basic requirements of ergonomics which allow us to serenely use the planned spaces. Anyway, from a teaching point of view, this kind of classification features great potentialities and is apt to stimulate students to regard the technological solution as a "solution" to a problem rather than an undiscerning offer of prepacked solutions.

But which changes are taking place today? A new range of requirements which are to be satisfied is overbearingly entering the world of the built environment planning. The ever growing problem of the environment – either connected to the question of materials and energy resources supply, or to the pollution following the whole object lifecycle, from production to disposal – will define a new class of services to be supplied. Nowadays it's not enough to satisfy functional requirements alone. When planners make their technological choices, they will have to select materials and products by respecting some basic principles: use renewable resources; use recycling-derived material as much as they can: employ in turn easily recyclable materials (and this involves both the use of materials inclined to this second transformation, and easily planned elements so that they can easily be dismantled or monomaterial); unrenewable resources employed will have at least to be widely available on earth; products will have to be selected among less energy-containing ones, not only as for

production, but also for the realization and maintenance in progress; elements will have to have adequate durability in their lifecycle and if necessary to be easily replaceable; elements will have to be produced locally in order to reduce energy costs and the amount of polluting substances owing to transport and so on.

The changes taking place in the current world of building professions – the outlined model has at the moment few locally prescriptive confirmations, but it accounts for the near future – are just a soft echo of what is happening in the areas of research and legislation in EU, circles where the identification of criteria and instruments for the environmental quality assessment of materials and products are most active. Environmental certification systems are helpful for this tough activity of comprehension and selection, notably ecolabels and EPD (Environmental Product Declaration).

Environmental labels are classified in accordance with ISO 14020 suggestions, that is into three groups. Kind 1 labels are supposed to conform to the limits of environmental performances (peculiar criteria on pollution standards, energy waste,and so on) established by the body in charge of the mark itself: for example, for the European Ecolabel, these values are defined by the European Committee after a path which includes a deep analysis of LCA (Life Cycle Assessment) of the product group into consideration. Therefore a type 1 mark cannot be conceded for all products, but only for those whose criteria have been defined.

Type 2 marks are based on the producer's self-declaration, which is neither validated nor certified. Type 3 marks assure that information contained in a product environmental declaration correspond to reality as they are drafted in conformity with specific reference prescriptions. The Environmental Product Declarations belong to this category. So type 1 marks are mainly aimed at products for the wide public who will be able to choose them only by the presence of their outstanding logo. Instead type 3 marks are suitable to professionals who can understand the meaning of the producer's information and make a choice targeted to the context.

It goes without saying that all the ecological labels – apart from the 2 type label in some cases, when it might as well partially contain information which the company is accountable for – have an LCA procedure as their starting point, defining input and output as regards resources and emission of polluting substances. It is clear that major hopes are placed in the promotion of the EPD marking procedure, which would allow to outline the environmentally sustainable features of any product launched on the market, without creating technically incomplete presumptive lists of merit, wrongly disproportionate in the market.

So, in spite of the great interest in the subject, many problems are to be solved yet. What surprises most is that whilst in industry it is comparatively easy to define – through LCA procedures leading to different kinds of certifications – the main features of a product about the energy it contains, the polluting emissions brought about by energy mix used for production, and so on, as the final object is usually well defined, in the building industry all the products contribute to form variable systems in accordance with the assumption that "with the same ingredients, if you change the recipe, you may prepare different menus". This means that the final element performances are not only dependent upon each sub-element used, but also upon their

layout, their fixing methodology and so on, even by their position within the macrosystem of the building. So the quality of environmental sustainability of the completed element will not only be the simple sum of single amounts. It won't be enough, in other words, using high-quality products to obtain high-quality final results.[1]

How can these aspects affect the teaching of technology? Teachers might explain the reasons for the upcoming need to assess the environmental quality of the building product; they might try to trace the basic standards for quality definition – and even quantity standards if they are skilled – of the product eco-sustainability , they might compare the products and their performances.

But it is different to make an absolute final comparison, a sort of list, which through the input – product certification which can trace the main features of environmental impact, physico-chemical performances, role in the building element in which it is going to be set, performance of the inner macrosystem of the building, durability, etc. – allow us to get the output, the technological choice.

This might be only possible by deciding a presumptive gerarchy of goals that at present is still far from the world of planning (but it might not as well be clear to the world of environmental science): the reduction of CO2? Or of sulphates? The privileged use of renewable resources? Priority to the products with low energy content? Luckily most of these standards are interrelated. But how can we let the designer (it does not matter whether he is a student or a professional) assess the element at work? Research is showing that it is possible (with surprising results and the abolition of some prejudice about the either so-called "ecological" products and those commonly regarded as highly impact products) but very difficult: anyway results are uncertain and deeply dependent upon the point of view adopted by the choice of analysis. So it seems difficult to imagine the creation of assessment systems within reach of the average professional who often – at least in Italy – keeps existing. This is the way, but at the moment, we walk in pure research.

Note

1 As a matter of fact this happens all the time, and not only in world of eco-compatible products.