

ARCHITECTURE: CONCEPT, FORM AND AESTHETICS FROM THE PERSPECTIVE OF SUSTAINABILITY

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Summary

Sustainable architecture should represent a holistic approach, both ecological and economical, but also sustainable in the social and cultural fields, and, most importantly, able to fulfil the aesthetic expectations of the society. It should be concerned with far more than just technical and technological aspects of the construction.

Assuming that form is the outer expression of a building's aesthetics and form, in turn, is represented by the building skin, or envelope, we can argue that such "envelope" does not only have to define the appearance of the building we perceive, it can, in the way it is designed, shaped and related to the many functions a building has, also have the potential to solve its future technical needs.

Can sustainable architecture have its own form and aesthetics; is any particular formal expression advantageous for sustainable architecture? Is there anything like "intelligent skin"? Can the envelope of a building carry more functions and become separated from the building itself? Is the concept of a "house inside a house" the solution to future building needs of all scales and typologies?

1 Understanding sustainability: the role of architectural and aesthetic quality

Sustainable development is defined as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" [1].

The widely accepted view of the main themes of sustainability sees energy consumption, greenhouse gas emission and the devastation of natural resources as the most important topics to be dealt with. And since the built environment represents about 40 % of the world's energy consumption [2], sustainability has quickly become an important issue in the design and construction processes.

Green, or eco, construction has become a tendency, often more used for marketing purposes than for real effects. As Václav Cílek says, two basic approaches of sustainable architecture have developed: the nature-mimicking way based on organic shapes and natural resources and the purely engineering one, which fills any building with such technological equipment which makes its energy consumption as low as possible. As he declares, none of the two can ever be ecological. [3]

The need to define how much a building is sustainable led to the creation of various rating and certification systems that try to quantify ecological aspects of buildings using – mainly – hard data. However, as Michael Braungart and William McDonough say, designing for the future should primarily be "delight, celebration and fun" [4].

Yes, since the very beginnings of architecture, we feel that architecture has to be approached in a different way: subjective criteria which cannot be so easily quantified form one of its most important characteristics. Architecture is still today defined by the three Vitruvian canons: durability, utility and beauty [5].

Architecture, or rather, good architecture, is simply something that cannot just be measured and calculated. “There is architecture, and it is the embodiment of the unmeasurable” [6].

2 Form, expression and skin of (sustainable) buildings

Many architecture theoreticians argue, that it is form of a building what defines its aesthetic quality [7], i.e. one of the three basic and crucial conditions that define architecture as such. Already at the end of the 19th century, the famous and ever since disputed statement that “form ever follows function” was made by L. H. Sullivan [8]. Giving form to a function is, according to some, the difference between architecture and civil engineering [7]. And hence a logical question: shouldn't sustainable architecture have a form of its own [9]? The answer is very disputable, as many architects would probably say that in principle, all good architecture has the automatic potential to be sustainable.

How is form represented? It is the outer skin of a building what usually defines its form. Such a skin has always had many functions.

Today, thanks to new material and technological possibilities, these functions of the skin are ever expanding and we may even reach the point when the inside of the building can concentrate solely on its primary function (i.e. residence, hospital, library etc.) without having to take into account any other needs. All these can be satisfied by the building skin.

One of the first to propose a façade that would be more than just a weather protection and decoration was Le Corbusier with his so called “neutralising walls” for the Centrosoyuz building in the 1920's [10]. Architect Martin Rajniš goes today much further, saying that what buildings need is an “intelligent skin”. A skin similar to that of living organisms which can directly respond to the changes of the outside (and inside) conditions and environment [11].

3 Functions of the building skin

Since the beginnings of civilization and hence of architectural history, the building skin (or, traditionally, the façade) has had various functions. Today, some of these lose their importance, but on the other hand many more arise.

The traditional functions of a building skin have always been:

- **Protection:**
Basic protective function against the weather (heat, cold, wind, moisture, rain, sun and glare etc.), the burglars, mechanical damage to the building or its contents, fire, noise, lack of privacy etc. Most today's buildings still require their skins to provide this function;
- **Representation (decoration and beauty):**
Façade has always been what gave a building its importance and image;
- **Structural function:**
This is one of the functions that, in many modern buildings (ever since the modernist movement and Le Corbusier's five points [12]), is no longer true. The structure of the

building itself and that of its skin are clearly separated. giving today's buildings more flexibility. Skin can be updated without the need of an intervention to the interior;

- **Supply function (comfort):**

It is the building skin, which, through its openings and other elements, provides the building with light (and shade), heat and solar gains, ventilation, view etc. Today, electricity can be generated by systems integrated in façades and roofs.

The problem of the 20th century and the globalization of architecture is that the building skin has lost many of its original functions and mainly, its traditional localization. That is, the special characteristics that differentiated the form, shape and material of buildings in various climatic conditions around the world. A huge problem was thus created and the traditional functions of the building skin were replaced by technology and machinery that took up huge amounts of resources but also of space inside the buildings. The very principle of the modernist philosophy was destroyed. One of the approaches today may be to divide the skin from the actual function of the building itself in such a way that the two become almost completely independent [13].

A way to do this is the integration of modern technologies and materials into the building skin. But this is not enough, a rational and respectful approach to local conditions, something valid ever since Vitruvius, is a must.

It is however important to say, that there is (should not be!) no fixed doctrine on what the “correct” material of a sustainable building skin should be. Intelligent and humble use of almost any material can be justified as sustainable. And, obviously, the creation of a separate intelligent skin is not the only way to approach the future of architecture. The concept of the house inside a house with a fully developed transparent (or semi-transparent) second skin is one of the possible solutions.

4 The house inside a house concept

Transparent skin is a very appealing architectonic solution in modern architecture. Thanks to the possibilities of integration of various technologies into such a skin (photovoltaic panels, shading elements, natural ventilation elements, heating, solar chimneys etc.) it is in my opinion an interesting basis for the future development of sustainable architecture, at least in mild and moderate climate, or even colder climate with sufficient winter solar gains.

The concept of the house inside a house goes a step further by fully separating the outer skin to become completely independent of the actual building. This offers an extra buffer space which is neither an exterior environment, nor a classical interior space, and allows for a completely different approach to the spatial organisation of the building. Such a second skin may take the form and materiality of a simple greenhouse. The interior conditions may fully benefit from its effects – it is “an outer skin that offers protection from bad weather and balances climate needs, operating as a greenhouse in winter and as a shading structure in summer” [14]. The interior spaces may be composed of separate modules that do not need a classical insulated façade any more, and benefit from high degree of flexibility.

This technical approach can also be used for building renovations. As built and designed examples show, all sizes and scales are possible – from simple family dwellings, to schools... to whole cities (design proposals of Frei Otto and R. Buckminster Fuller [15]).

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