

ECOLOGY AND DESIGN ECODESIGN

**József Zalavári, Budapest University of Technology and Economics,
H-1111 Budapest, Műegyetem rkp. 3.**

The numbers of design problems are increasing, they are becoming more complex and their character is changing. This is the reason why we have to analyse, to re-define and to discuss their meanings from a special “design” point of view and to research their relationships to other subjects.

All the processes of our created environment – its continual change, progress and evolution to name a few – are similar to the world of nature. The human being has created its own objects during evolution. It was the process through which it evolved its abilities, increased its effectiveness and multiplied its physical and intellectual facilities. In the last few millennia human evolution has slackened speed, or we can say the process has been transferred to human object creation. Economic development in the second half of the 20th century was much larger both in change and effect than the entire former period from the first stone axe to the nineteen-fifties. This explosion of the development process can neither be explained through natural sciences nor through social sciences, although its regularities and harmful consequences need urgently to be explained.

The ecological view of design needs new words for describing design development phenomena and new models of design development process.

1. PIONEERS OF ECODESIGN

Marcel Breuer’s 1927 essay, ‘Metal Furniture’, conveys his enthusiasm for the materials and reveals his green credentials. He designed his first tubular metal chair, the B3 and Wassily armchair. He rationalized and standardized components, allowing the production of ‘flat-pack’ chairs that could be reassembled, so save on transport energy and were durable and inexpensive.

Other designers, writers and theorists who have contributed to greater understanding of environmental design include Victor Papanek, author of *Design for the Real World*, who related ecological awareness to the design process and urged for radical design solutions that were mindful of the environment. Papanek linked design to the overall theme of ecology at an early date.

It was most famously pioneered by Richard Buckminster Fuller, who in the 1920s promoted a “design science” that was based on the concept of “providing the most with the least”. It was he who, in the 1950s, coined the term “Spaceship Earth”, which led people to think of the planet in a more holistic way. Ironically, one of the early advocates of a more sustainable design philosophy, originated from the USA, a country renowned for both prolific production and consumption. Buckminster Fuller preserved and in 1949 developed a new method of construction based on lightweight polygons.

His legacy inspired new endeavours such as the Eden Project, near St Austell in Cornwall, UK (2001), in which the world’s largest biomes house eight thousand plant species from tropical to temperate climates.

Organic design borrowing from nature’s own model of components within systems. Frank Lloyd Wright was the first to blend the functionality of buildings, interiors and furniture into one concept. In 1942 Charles Eames and Eero Saarinen, firmly established their biomorphic plywood furniture as a means of satisfying the ergonomic and emotional needs of the user.

Dieter Rams is Germany’s most important post-war designer. His approach to design has always been based on his “Ten Commandments on Design”. His declaration that the “aesthetic requirement of an industrial product is that it should be simple, carefully made, balanced and unobtrusive”. Essentialism in Braun design through efficient, well-designed and executed products that incorporated state-of-the-art technology. His book “Less and better”, design will firstly be able to influence the permanent improvement of the material ecological quality of products- and, even more critically, will contribute to an effective reduction in the overall quantity of products produced.

Philips Managing Director Stefano Marzano has been proclaimed the value of Philips approach (1998), which he named “High Design”. By High Design, he means an integrated process incorporating all the skills on which design has historically based itself and the new design-related skills we need to be able to respond to the complexity and challenges of the present and anticipate those of the future. Philips have a responsibility towards the creation of a better future for people, in which the environment is respected and energy is preserved. “High Design” plays an important role: through the introduction of emotional values, design

supports the creation of a new relationship of care and affection between people and the objects they use, thus increasing the chances that these do not get thrown away before the end of their life cycle.

2. THE BIRTH OF ECODESIGN

It's true that there was an ecological and pacifist movement in the USA in the early 1960s, which rejected the idea of a highly industrialized society and pursued a policy of self-sufficiency, producing its own tools, dwellings and food. Ten years later, as a consequence of the energy crisis, this movement exerted an influence on certain designers in Europe, and especially in Scandinavia, the Netherlands, England and the German Federal Republic. The Green Party, a German popular movement that became a political force. These people advocated an ecological, naturalistic design. The design history is bound up with the functionalism. A hundred years ago, Louis Sullivan proclaimed that "form follows function". Based on a deeper understanding of how our life and products are shaped by ecologically interconnected flows of energy, information, materials and resources. There was also a certain ethical aspect, a desire to restore to the object its truth and honesty. And if we analyse their work today, we can clearly see how closely they were linked to the leading scientific movements of the time.

3. ECO-THEISM

Approximately hundred years before the well-known formula of Louis Sullivan, "form follows function," pointed the way to the theory of functionalism, the Shaker religious community had laid down among the principles of its faith that "beauty arises from practicality. Their life was marked by order, diligence and modesty. Their faith expressed itself in the clean-lined beauty of their tools, their furniture and handmade articles of daily use. The Shakers were open to technical innovation. Under the rubric of "less is better", Shaker furniture has again come to be appreciated throughout the world. Because of its craftsmanship, its functionality, and its simple beauty, the furniture enjoyed general popularity.

Taoism itself, something which greatly influenced its formation: the concept of Ying (darkness) and Yang (light). This is an ancient Chinese philosophical concept which originated thousand years ago. Tao has three points: having two polarities, being dynamic and being natural.

Wabi, sabi, suki are the pillars of classic Zen beauty. Wabi stands for the silent, simple charm of natural materials such as wood, bamboo or stone. Sabi is the patina which, as a result of

handling, renders an object even more beautiful over the years. Suki is describing the striving for beauty which breaks with conventions but always remains faithful to an ideal of subtle elegance.

Gaia is the name of an ancient Goddess, in her figure the archetype "Mother Earth" of different religions can clearly be recognised. A theory that interprets the wholeness of the Earth as a self-regulating organism. Gaia is the idea where organic and non-organic parts of a dense, competitive and interactive net generates a homogenous unity: a kind of metaorganism, the living planet. The human sphere is inside this unique and dynamic balance-system, and it has not been grown up to a self-regulating system. This theory comes from the writer, William Golding. (James E. Lovelock, 1979.).

The most important requirements of modern design arose less from the requirements of production than from the ethic of bourgeois Protestantism. It was less often questions of technique than of religious belief.

The civilisation and the industrial society which let the ecological problems exist and now must face the dangers and issues was developed in the Christian culture. Christian monotheism desacralized nature, the body was secondary, non-essential, living on Earth was declared to be preliminaries to Eternity. This point of view could indirectly give reasons for this culture not to take enough care for the preservation of the intact character, the wholeness of the man-made world. The Jewish-Christian notion of eco-crisis can be explained as a consequence of the fault against justice: goods produced on Earth are not equally distributed. Initiatives of Christian-ecological aspect are becoming more dominant. (1989. Basel Economic Conference. Theses: Justice, peace, creation, God.)

4. ECOLOGICAL AGE

The ecological age into which we are presently moving is an opposed, though complementary, age that succeeds the technological age. In deeper sense this new age takes us back to certain basic aspects of the universe which were evident to the human mind from its earliest period, but which have been further refined, observed, and scientifically stated in more recent centuries. These governing principles of the universe have controlled the entire evolutionary process from the moment of its explosive origin some fourteen billion years ago to the shaping of the earth, the emergence of life and consciousness, and so through the various ages of human history.

In modern usage, ecology refers to the environmental system and economy to the human economic system. In its greek meaning, "oikos" is the house or household and the words

economy and ecology are derived from it. “Oikos” is the integral system which contains the fundamental human designing activities and behavior in connection with production, communication and the environment.

Ecology is a relatively new scientific discipline. Like young disciplines, ecology is developing very rapidly. Ecology is now a component of courses taken by geographers, planners, industrial chemists, engineers, architects and product designers.

5. DESIGN ECOLOGY. EVOLUTIONAL VIEW OF DESIGN.

Design ecology is a scientific study of the interrelationship among products and between them and all aspects, living and non-living, of their environment. A science for examining the interaction – its actual existence and the changes – in design procedures, for systematically analysing and explaining the design. Field of study relating to the whys and wherefores of changes. Designers understood that the relation between form, function and material must be interpreted in a cultural perspective, taking account of contemporary life-styles and aspirations.

Forms, changes and alterations in production designing processes are a kind of evolution which is developed and directed by consciously organised human activity. Both the designing process itself and the “life” of the market object can be examined with the help of definitions of evolution such as mutation, variation and selection. Nowadays directions in development are not based on fulfilment of elementary needs. As we possess all the possible ways of production, the main question is the ability for selection in a definite environment. The evolutionary view is a special view of historical characteristics of objects and it is an important and fundamental idea in design methodology. It can represent more or less completely the functional and morphological variations or permanence of objects, and on the other hand their regularities.

6. ECODESIGN

Ecology had ramifications for design too. Eco-design, a new view in industrial design: the eco-consciousness in designing. A point of view called “ecological design” was born of the relationship between environmental destruction, the disposal of product, and the industrial waste problem in our industrial society.

Eco-design means approaching design from a new perspective. It means minimizing the environmental impact of a product while maintaining the same level of quality. The ecodesign movement is one facet of the drive to achieve sustainable development, “satisfy demand today

without undermining the chances of future generations to satisfy demand tomorrow” (The World Commission on Environment and Development 1987).

The principle of sustainability originated in the field of forestry and is as simple as it is illuminating: only as many trees should be cut down as can be replaced by young ones. The Rio Earth Summit (1992) declared this principle to be the great theme of the future : resources must be saved and processes of regeneration promoted.

Ecodesign should be viewed as a factor of innovation that business enterprises to build the environmental component into their business development strategy. Good design is ecologically responsible design. Three principles can be applied to product design:

- Consider the life cycle of the product.
- Optimize length of product life. Optimize end of product life.
- View the product as a multi-components system.
- Adopt a multi- criteria environmental approach.

The product should not affect the environment adversely or cause any kind of damage during its product life. The design process intends to reduce the harmful influences and enlarge the positive ones while using technical, technological, social, economical and cultural possibilities of a given society. The design philosophy of this intention is the holistic product and holistic firm. Victor Papanek, Thomas Moldonado, Dieter Rams, Stefano Marzano and Ezio Manzini are to be mentioned as representatives of this tendency.

A design approach that gives preference to the discovery, re-cycling technology, creative and multifunctional composing of design elements. It will always find an individual design solution in different political situations. Instead of typical and monocultural it intends to be diverse and multi-ethnic. Self-consciousness, healthy life, free and idealistic ideas, morality in personal life are the most characteristic points of this way of thinking.

7. ECOLOGY AND AESTHETICS

Evolution has produced living forms of great complexity and beauty. It may also be able to develop new aesthetics to appreciate the beauty of the products of ecodesign. Today designers and engineers are beginning to work together with artificial evolution. Harmonious balance of ecology and economy have an aesthetic issue. The ecology and economy are involved a new aesthetic (and ethical) problems.

To use knowledge, rule and principles in technology, which were obtained during the examination of natural organic forms, structures and processes. The creative imagination of designers can be highly inspired by the recognition of what kind of connection there are

among biological, technical and man-made systems as well as by the knowledge of natural forms, structures and constructions. We can come across natural principles of construction all over the world: stressed-skin structures, cell-constructions, streamlined planes and ships. The model of the sandwich-construction was developed after having analysed the wheat-stalk. Bionics is legal and is worth expanding, as space experiments, space objects, tools and reinforcements are also shaped in this way. In order to develop future strategy models, technology is also increasingly falling back on biological models.

The aesthetical category of beauty should be widened: it includes beside the artificial, technological and natural kinds of beauty the ecological intentions, theories, that appears in the new and former designed objects.

8. ECODESIGN CRITERIA.

National and international awards have the intention to acknowledge the ecologically excellent products. There was a search for ecological design method to find the a design paradigm between nature, human artifacts and the global environment. As an example we can show the criteria of the Ecology Design Award, founded 1990 in Hannover:

1. Selection of materials, use materials that have environmental benefits. Advanced materials development has been towards the creation of new materials which have unique properties, made through the integration of chemically different substances. (Composite plastic materials, biodegradable materials)
2. Efficacy of materials, minimise their use. The simplicity of products can, for example, be achieved by limiting it to a few componens of materials. Electronic units, chips, circuits etc. will reach the minimal possible measure - this is the expected design task.
3. Efficacy of energy. Frugality in material and energy consumption is one the most important paradigms for ecological responsible design. The new manufacturing process has resulted in less energy being used to produce the same number of units.
4. Efficacy in using technologies. The permanent reduction of measures in the industry allowed by the technolgical development.
5. Suitability for re-cycling. To collect and/or process waste from a system to result in a useful application in the same or in another system. To treat things that have already been used so that they can be used again. Recyclable material can be made into new material.
6. Long-time product-life. Long-term validity is expressed onthe one hand by a design which consciously does not follow fashion trends , in which there is real design and not merely styling.

7. Suitability for repair and removal enabling re-use, design for easy disassembly
By consolidating the number of parts and by employing compatible materials the components of durable products can be separated out and re-used when the product-life is over. The individual parts should be made of simple materials rather than compounds. Design and manufacture for eventual disassembly also influences chemical fasteners and joining devices.
8. Simple service and maintenance. The usual service life of the product must be considered here. Clean life cycles of product embraces the entire: production, distribution, use, service and disposal.
9. Functionality (technical, semantical-ergonomical, esthetical, secular). Doing justice to functions often forms the basis for an ecologically product design. Price in relation with applied materials and market-overproduction. Harmonious balance between ecology and economy as a balance in a market economy. Price should be the truth in ecological terms. It has eco-taxes, financial incentives.
10. Strategy of usage. The product should be meaningful in function not only itself but also in relation to other objects. Durable products should also be timeless in terms of design. New ideas on ecodesign which fulfill the fundamental, design evaluative criteria.
11. Infrastructure. This means that uses have to be found for recycled plastics in order to stimulate the development of a recycling infrastructure.
12. Standard of novelty and innovation. Effects on the behaviour of the user. Environmental sustainability requires user to take a holistic view. These aesthetic principles would also suit average people. New ecodesign paradigm creates new value tomorrow.