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RISK IN DESIGNING THE RESIDENTIAL ENVIRONMENT

RYZYKO W PROJEKTOWANIU ŚRODOWISKA MIESZKANIOWEGO

Abstract

The development of methods for designing a modern housing environment is associated with the risk arising from the uncertainty. Risk identification and assessment are the key elements in the search for innovative design solutions. The paper presents the main areas of risks occurring within the scope of residential environment design. The methods for minimizing the risks and opportunities to improve the quality of housing architecture based on the environmental approach are identified.

Keywords: risk, housing environment, design strategies

Streszczenie

Rozwój metod projektowania współczesnego środowiska mieszkaniowego związany jest z ryzykiem wynikającym z niepewności. Identyfikacja i ocena ryzyka są kluczowymi elementami poszukiwania innowacyjnych rozwiązań projektowych. W artykule przedstawiono główne obszary ryzyka występujące w projektowaniu środowiska mieszkaniowego. Wskazano metody minimalizacji ryzyka oraz szanse poprawy jakości architektury mieszkaniowej oparte na podejściu środowiskowym.

Słowa kluczowe: ryzyko, środowisko mieszkaniowe, strategie projektowe

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1. PROBLEM

The paper is aimed at focusing on those aspects of risk that have the greatest impact on the quality of housing environment. One may ask why the modern housing environment is so often criticized as inhumane, suppressing individuality, anonymous, and not giving a sense of security. The author believes that these features are largely the outcome of not taking into account the risks posed by today's socio-economic situation.

In the past, the risk and related uncertainty was associated with the will of the gods and oracles, condemning people to helplessness in the face of an unknown future. In modern times the risk associated with the future is created by the socio-economic system itself, which is becoming a threat to itself. This is an important difference compared to the former way of understanding the risks associated with the unpredictability of "external" forces of nature and the lack of technical possibilities to counter the risks[1].

Currently, the risk is considered as a result of specific circumstances and actions. Contrary to old threats we ourselves can calculate the risk and our risk assessment takes into account the possible losses and potential benefits of decisions taken. The problem lies in the fact that we come across substantial difficulties in anticipating and calculating risks. The uncertainty is largely due to the side effects of new solutions in the economic, social and spatial spheres, the effect of which is very often different than the intended and expected. As Beck writes, "*the gain in power from the techno-economic progress is quickly overshadowed by the production of risks"*[2].

The author emphasises that in modern society the uncertainty of everyday life increases. It is commonly believed that the number of risks is greater than in the past. This conviction is fuelled by the media, which in pursuit of sensations are trying to outdo each other in exposing calamities, economic crises, social pathologies, natural disasters, and catastrophes. This results in rise in the sense of insecurity in the economic existential and behavioural spheres. We are observing an increasing need for security and social pressure on anticipating various threats. This state can be summed up by the words of Giddens, "The people are threatened with a lasting sense of insecurity"[3].

2. UNCERTAINTY IN DESIGNING HOUSING IN THE ENVIRONMENT

uncertainty has not spared the housing environment. Despite the noble core curriculum that involves many well-known designers and architecture theoreticians, it seems that the emphasis on commercialization and quick developer's profit is a very risky approach. This approach results in a rising sense of insecurity. One can list such aspects of risk as:

- illusive expectation that the current prosperity will continue in the future,
- speculative mind-set of the investors based on short-term profit combined with the drop in value of property in the long term,

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[1] P. Stankiewicz, *W świecie ryzyka. Niekończąca się opowieść Urlicha Becka*, Studia socjologiczne 2008, 3(190), p. 117–134.

[2] U. Beck, *Społeczeństwo ryzyka. W drodze do innej nowoczesności*, trans. Cieśla S., Wydawnictwo Naukowe Scholar, Warszawa 2002.

[3] A. Giddens, *Konsekwencje nowoczesności*, trans. E. Klekot, Wydawnictwo Uniwersytetu Jagiellońskiego, Kraków 2008, p. 79–92.

- increasing costs of housing maintenance due to hikes in the price of energy, water and waste disposal.
- dispersion of residential development which increases the cost of maintenance and repairs of the overstretched technical infrastructure (water and sewage networks, roads),
- peripheral locations of new residential developments resulting in communication problems associated with daily commuting,
- poor quality of urban landscape, unattractive architectural form that affects the market value of the apartments.

Mistakes in risk assessment in architectural design are the main cause of the criticism of architectural solutions, the dehumanization of the housing environment, nuisance in life, and social problems.

On the other hand, the risk associated with housing investments constitutes a factor affecting the progress. While defining the algorithm of rational risk taking, the way has been paved for creative architectural solutions linked to innovative technologies.

Consequently, the risk has become an opportunity and not just a threat. Being prone to risky decisions is reflected in modern designing methods and contributes to the creation of avant-garde architectural solutions.

Competent risk management allows a competitive advantage to be gained. In particular, it is about the use of risk reducing solutions and thus increasing the benefits of innovative concepts.

One proven tool for searching for such solutions are synectic methods, in which environmental analogies that comprise observation and the creative use of the laws of nature play an important role[4].

3. DESIGN STRATEGIES FOR REDUCING THE RISK

the idea of linking human activity with the quality of environment was born a long time ago. Architecture belongs to one of those areas that have considered at the earliest the environment as an element inseparably linked with the activity of individuals and groups of people. The primary structure that naturally exist in nature gave rise to architectural works. The "Natural Home" in the form of the archetypal hut of Abbé Laugier[5] inspired the great creators of architecture such as Frank Lloyd Wright, Le Corbusier, Jacobus Pieter Oud, Pier Luigi Nervi, and Louis Kahn.

Many ancient towns and buildings implemented classic beauty comprising harmony and moderation inspired by the observation of nature.

Not by accident are cities considered to be artificial eco-systems built by man. Just like natural ecosystems – cities with all their social, technical and natural structure demonstrate the self-regulation ability which is a condition of development.

In this context, one may ask whether the laws governing natural ecosystems may provide inspiration for the creation of new architectural solutions.

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[4] J. Antoszkiewicz, *Metody heurystyczne. Twórcze rozwiązywanie problemów*, PWN, Warszawa 1990.

[5] MA. Laugier, *An Essay on Architecture,* trans. Herrmann W&A, Hennessey & Ingalls, Inc, Los Angeles 1977.

The author believes that this kind of inspiration is useful in minimizing the risk and seeking innovative design solutions.

The analogies inspired by studies on natural ecological systems are still not fully utilized in modern methods of designing the housing environment. The natural systems have self-adaptation and self-regulation abilities. Homoeostasis is the term used to describe these processes in biological systems[6]. Thanks to this, biological systems retain the ability to remain in an equilibrium state, retain their full utility under changing external conditions. The author presents the opinion that the phenomenon of homoeostasis occurring in stable and sustainable natural ecosystems should be used to a greater extent (as an inspiration) in the contemporary approach in designing residential development.

System engineering finds here its basic application. It is particularly useful in attempts to imitate the natural biological regulation in steering the housing environment.

As with natural systems, in residential complexes one can differentiate many levels of functional technical organisation. The essential homoeostatic mechanisms, i.e. regulation and balancing, action and reaction, combine different levels of functional organization. Consequently a certain integration is created comprised by the fact that smaller utility complexes function within larger ones. J.K. Feibleman called this phenomenon the "theory of integrative levels"[7].

The principle of functional integration about the emergence of additional properties and functionalities, new functional and compositional values as the complexity of structure increases is of particular importance in the process of designing the housing environment. One can list here the following design strategies[8].

A. Traditional strategy

The housing environment is shaped on the basis of solutions depending entirely on the energy supplied from the outside. The flow of energy is unidirectional and the functioning of residential buildings is dependent upon infrastructure services supplied from the outside and disposing of waste to the outside. The newer generation of this type of objects features a high saturation of IT systems ensuring the control of heating and ventilation, fire safety, access control, etc. A characteristic feature of these solutions is the aesthetic commercialization adapted to a short-term trend, closely focused on the tastes of predefined user groups, lack of careful references to the context and references to the surrounding landscape.

B. Partially self-regulation strategy

The housing environment is shaped on the basis of solutions consisting in partially closed flows of energy. The residential complexes are equipped with mechanical or biological recycling systems. Some of the energy is obtained directly from the renewable sources (solar energy, wind energy, geothermal energy). The vulnerability to risks associated with unexpected events is lower than in *A* solutions, but it largely depends on the reliability of devices, efficient handling, speed of elimination of defects and risks destabilizing the internal system.

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[6] E.P. Odum, *Podstawy ekologii,* Państwowe Wydawnictwo Rolnicze i Leśne, Warszawa 1977, p. 52–55.

[7] J. K. Feibleman, *Theory of Integrative Levels*, Brit. J. Phil. Sci., 5/1993. p. 59–66.

[8] W. Bonenberg, *Architecture of Terminals. Integration of Art and Technology*, FA, Poznan University of Technology, Poznań 2007. p. 13–18.

This type of building is characterized by lower energy consumption for heating and cooling as well as economical water consumption (partially closed circulation systems).

The characteristic features of this type of solutions are as follows:

- Limitation of ventilation and recuperation systems in favour of natural ways of supplying air by means of advanced aerodynamic analysis and suitable shaping of buildings.
- Use of partial or complete waste disposal within the housing complexes, combined with the recycling of certain substances.
- Architectural composition exposing to a large extent the individuality of creators, originality of ideas. Becoming an inseparable part of the surrounding landscape, respect for nature, reference to the cultural and aesthetic preferences of the residents, and legibility of functional solutions are deserving of special emphasis.

C. Homoeostatic strategy

The advantage of this design approach is a high degree of vulnerability to functional and compositional changes combined with resistance to crisis situations in connection with the far-reaching self-sufficiency of housing complexes. Solutions of this type are characterized by high adaptability and accommodation to the changing external environment parameters and user needs[9].

The closed energy, water and waste circulation systems make it possible to achieve environmental sustainability within the housing complex, and to eliminate the negative impact on the environment. The space of the housing complex is dedicated to the development of semi-natural biocenoses.

The characteristic feature of this type of solutions is the lack of monotony and diverse environment. The architecture provides residents with an exact number of diverse stimuli, it gives the opportunity to meet not only basic needs, but also higher-order needs, contacts with your neighbour, pursuing your own interests, active recreation, and entertainment.

The homoeostatic buildings consume much less energy than conventional building structures. This effect is achieved by using devices capable of obtaining energy directly from renewable sources. The reduction of energy used for heating and ventilation is also possible thanks to the use of biological natural and semi-natural systems. The form of buildings resulting from thermo-energy optimization is of great importance.

Also important is the use of bio-climatic elements that reduce heat loss and excessive increases in temperature through the use of soil and plants to stabilize the micro climate[10].

The systems of this type are largely independent from the traditional external technical infrastructure. The internal circulation of materials and energy flows involve natural biological complexes (highly efficient and stable biocenosis) in the form of greenery complexes located indoors and outdoors. Their size and population structure is important for oxygen and energy balance as well as for the natural or semi-natural regeneration of water. These systems include homoeostatic feedback between residents, greenery complexes and IT systems.

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[9] D. Hawkes *The Environmental Tradition. Studies in the Architecture of Environment*, E and Fn Spon, London 1998. p. 66–71.

[10] W. Bonenberg, *Energooszczędne formy architektoniczne*, in: Energooszczędne budownictwo XXI, Mat. Konf. Politechnika Poznańska – Fundacja na Rzecz Rozwoju Politechniki Poznańskiej – PZTIB., Poznań 2000.

A characteristic feature of these solutions are biological regeneration systems. The progress in this field is dependent upon the development of studies on closed ecosystems. They are crucial in determining the minimum space able to maintain homoeostasis within housing complexes. The natural and semi-natural biocenotic complexes diversify housing environment, positively affect the psyche of residents, and humanize the environment. This design strategy is an effective tool to prevent the threats. To a large extent it reduces the unpredictable effects of external threats (e.g. sharp rise in prices of energy and water), and increases the chances of gaining a long-term competitive advantage in terms of the value of apartments.

4. SUMMARY

The ability to formulate forecasts regarding the probable course of future events, and making a choice between various future scenarios constitutes the most important element of risk management in residential architecture. The risk control indicates the decisions related to taking such decisions as the location of the investment project, functional-utility program, safety of use, energy saving, environmental impact, and acceptance of the proposed aesthetic and functional solutions by the residents.

In this context, the self-regulatory approach emulated from homoeostasis in self-reliant natural ecosystems can be an effective tool for dispersing of risk and an inspiration to create avant-garde design solutions.

References

[1] Antoszkiewicz J., *Metody heurystyczne. Twórcze rozwiązywanie problemów*, PWN, Warszawa 1990.

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