Visions of the Future of Post-Industrial and Post-Pandemic Housing Architecture

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Abstract. The article is devoted to the visions and problems of the future of post-industrial and post-pandemic housing architecture. Architecture always strives for society and trends in it, sometimes anticipating, sometimes lagging behind in its expressions. Now there is another industrial revolution, which should lead to a transition from an industrial to a post-industrial society. The main directions in the change of modern society affecting the architectural design of the living environment are analyzed. It is also alleged that the pandemic was Covid-19 a catalyst that identified serious gaps in the organization of the residential environment. Outbreaks of viruses have occurred and will occur, especially in megacities. The need for social distancing, restrictions on their stay in their own home called into question the accepted principles of designing a residential environment. In the context of the ongoing global socio-economic changes, there is an urgent need for prudent modernization of traditional residential design models. Experimental housing architecture is a long tradition of finding new forms of housing, supported by the desire of society to find answers to the challenges of time, where the architect has a significant role. The article considers the recommendations of students of architects of the Moscow State University of Civil Engineering on the design of a residential environment with promising proposals for solving existing housing problems, which they carried out during architectural design.

1. Introduction

Every generation of people believes that they live in an era of change. Partly this is true, in the subjective perception of time there is nothing the same. The feeling of change is a philosophical category and is associated with the psychological state of people. But very few people will dispute the idea that right now we are in a period of global, large-scale changes, often described in apocalyptic tones. And architecture always strives for society and trends in it, sometimes anticipating, sometimes lagging behind in its expressions. Now there is another industrial revolution, which should lead to a transition from an industrial to a post-industrial society.

Political scientists distinguish several main areas (the so-called "trends") of modern society [1]:

Robotization and automation of production. If in an industrial society there was a transfer of industrial production to the third world, then in a post-industrial society there will be a transfer of production not to people, but to robots. Robotization and automation make production cheaper and less energy-intensive, minimizing human participation. Basic food, household items, clothing and furniture are made available to everyone.

Desacralization of power and transparency of life. This direction lies in the formation of the most transparent state relations in the history of mankind. In any other previous era, power was much more
closed, ritualized, chamber. Not only the ruling elite becomes transparent, but also the life of an ordinary citizen. Everyone, being in conditions of voluntary "universal surveillance" (mobile phones, social networks, in which everything about his life, preferences, etc.) is independently posted, has the opportunity to observe the lifestyle of people who are thousands of kilometers away, other nationalities, religious denominations, traditions, preferences, etc. And this leads to the following trend, namely:

**Changing traditional moral norms.** This is now interested in politicians, sociologists, economists, etc. Universal transparency polarizes society, and within one group of neighboring members of society you can now find completely contrasting groups of people, which directly affects the principles of architectural organization of the living environment. Against the background of constant changes in social models and moral norms, there is a controversial process of differentiation and universalization of the typology of housing. The latter trend is manifested in the rapid development of the forms of variable, adaptable, flexible, typologically universal housing [2].

**Destroying the monopoly of utterances.** The monopoly on performances for the mass of people, on freedom of speech is gone. There is a painful transition of one form of society life (when only a few people had the right to mass expression of thoughts and the transfer of ideas to the masses) to another (when anyone can remove the roles of various intellectual levels and gather an audience), comparable to the discovery of access to writing from clergy to the masses). And in these conditions, the concepts of self-censorship and, importantly, self-organization come to the fore.

**Changing family practices.** According to experts, now the survival of an individual in society outside the family has become acceptable and quite comfortable, unlike the rest of the history of human life. The traditional family was based on the principle of division of roles and division of labour among family members. In the event of the death of one of the spouses, the second was in an extremely difficult situation. It is also known that expulsion from a community or family for thousands of years was equated with a death sentence (by the way, psychologists compare with this people's evolutionary fears of public speaking, fear of disgracing in public, because this would mean the risk of being expelled and dying alone). In the era of industrialization, family practices changed significantly. The family ceased to be a labor collective. Family members most often work outside the home, receive an individual salary, independent of the composition of the family and its availability in general. Therefore, there is no need for a sovereign head of the family as a leader of family production. Now it is predicted that traditional family models will be less and less attractive to people, because a completely successful and comfortable life can be lived without a large family, without a spouse. The family crisis is indicated by a growing number of single people, an increase in the number of divorces, single families and extramarital affairs, and a decrease in the birth rate. An indicator of this trend is that as early as 1960, approximately 5% of children in the United States were born to unmarried women, in 1980 this figure reached 18%, and in 2009 41% [3,4].

**Self-isolation.** The pandemic Covid-19 has been a strong catalyst identifying serious gaps in the organization of the living environment. Outbreaks of viruses are not a one-time event, they occurred and will occur, especially in megacities and shaded living environments. The need for social distancing, restrictions on their stay in their own safe house called into question the accepted principles of designing a residential environment.

In the context of the ongoing global socio-economic changes, there is an urgent need for prudent modernization of traditional residential design models [5-9].

Social and political cataclysms and crises are the impetus for revising and changing the cultural order of society. Moreover, one of the most important means to overcome such situations is the "experiment," which in historical retrospect led to the formation of new styles in architecture, in the formation of avant-garde schools, etc. At the same time, providing conditions for creative experiments in all levels of architectural activity is considered the main mechanism for maintaining focus in the innovative future [10-12].
2. Materials and methods
Research methods include comparative analysis and synthesis of foreign and domestic scientific, literary and design materials; using an interdisciplinary approach that takes into account issues in the field of psychology, sociology, legal norms that affect the set of requirements for the design of a residential environment. Also, the method of experiment in housing architecture is an eternal tradition of finding new forms for housing, supported by the desire of society to find answers to the current challenges of time, where an architect often plays a significant role. In foreign practice, experimentation becomes the daily practice of designing a residential environment, along with the weakening of regulatory, routine approaches to the organization of housing.

Therefore, as part of classes on architectural and structural design of residential buildings, students-architects of the Moscow State University of Civil Engineering were invited to design a residential environment as an experiment, taking into account the modern regulatory framework, but also with author's promising proposals for solving existing housing problems. During group consultations, it was discussed that socialization is a fundamental need of people. Further isolation can be very problematic in a world where we are already suffering from an epidemic of loneliness. As described above, traditional family relationships are losing value, a growing number of single-parent families, more and more people live alone, and do not interact with older relatives. Under these conditions, prolonged imprisonment causes serious psychological disorders. Therefore, the students had the task of thinking about how to achieve both social distancing and social interaction? How can we integrate outdoor space into the housing structure of the future? Homes became the only place where people could be considered safe, protected even from friends and loved ones. But do the size of housing meet the requirements of comfortable, independently organized life? How safe are collective spaces in the structure of residential buildings?

It also raises the question of inequality between rich and poor. After all, it is one thing to isolate yourself in a cottage with its own landscaped territory, or in a large apartment that provides the main requirements for comfortable living, another thing to be locked in a shaded, minimized space. Rightly, questions arise as to whether high-density housing will meet modern hygiene requirements in the post-pandemic world? How to modernize the typology of housing in which residents would live comfortably and feel protected and not alone?

3. Results
When interacting and discussing with students the problems of adapting the living environment to existing realities, students were offered recommendations reflected in the architectural design, which are presented below in a Table 1:

| № | Recommendations | Note |
|---|-----------------|------|
| 1 | Multifunctional residential building. | The approach to design began with a pre-design analysis of the design territory, the demographic composition of the population, to identify gaps in the organization of the surrounding territory. To ensure some isolation of residents inside the urban planning formation, most of the work was a connection of a residential and public part inside one building (when fulfilling fire standards), united by one composition and planning plan. Such a peculiar "city in the city" provides its "inhabitants" with the maximum necessary conditions for existence, which helps to reduce the need for frequent movement around the city, i.e. natural isolation if not in |
the apartment, then at least in the building. At the same time, students analyzed the most "household" often required public functions (grocery store, pharmacy, bank branch, circle premises, etc.), in accordance with the list of the main groups of premises that can be included in residential buildings according to set of rules 54.13330.2016 "Residential apartment buildings" and taking into account restrictions on the placement of institutions and service enterprises in residential buildings

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|---|---|
| 2 | Emphasis on landscaping. |
|   | The more diverse the house areas, the more proportionate, cozy, comfortable, pleasant surroundings. House territory is an ideal place for social communication. The functionality of landscaped spaces, walking areas, playgrounds, reasonable aesthetics, ergonomics and quality sufficient to ensure long-term operation, which does not require significant investments in repairs and upgrades - these are the obvious requirements on the surface for smart, non-binary house territory. |
|   | Public territory is a place that promotes positive social ties between people. Where we are pleased to meet, communicate, spend time together. Give people some variety of conditions for different types of activities - and they will self-organize, spontaneously form interest groups. A large table in the courtyard, where an adult part of the inhabitants will play chess; hammocks-swing for adolescents; paths for moms with wheelchairs, etc. - the greater the variety of environments, the more intense the interaction within the community. There is no task to separate individual zones - there is a task to organize an appropriate neighborhood of different zones of activity. |
|   | Closer to the houses are walking areas, children's playgrounds are attributed a little further from the windows of residential buildings - provided that the area of the house allows this. |
|   | Narrowly choreographed children's equipment often limits the variability of game scenarios and quickly gets fed up. And simple objects, on the contrary, turn out to be exciting and fascinating (fig.1). |

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| 3 | Terrace of residential buildings. |
|   | A large percentage of completed projects provide for the presence in front of apartments of extensive individual terraces intended for recreation and work. Despite a number of shortcomings (reduced building density, complexity of construction organization and high economic costs, etc.), "terraced" on one side, on both or several sides, residential buildings, as well as terraced buildings of variable storeys allow integrating architecture into the natural environment, have an aesthetically attractive look, create a comfortable temperature and humidity regime in apartments, and, most importantly, provide residents with the comfort of possessing an individual open area in the environment of collective living (fig.2). |

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|---|---|
| 4 | Separate collection of garbage directly inside the building by |
|   | This solution will contribute to improving the environmental situation and saving energy resources (fig.3). |
organizing several pipes of the garbage pipeline

For the first time in the history of mankind, the organization of labor is changing dramatically and rapidly. Millions of people around the world are now forced to work and study from home. In this regard, many are faced with the disorganization of the working area inside the home. Changing the format of work and study requires organizing a spatial environment with the inclusion of a work area for each family member. Moreover, it will no longer be a random small place. Now a separate well-equipped room or area with large windows and comfortable furniture will be allocated for the workplace.

5 Dwelling place of work

Modernization of traditional models of residential environment design should be carried out with mandatory consideration and in-depth analysis of regional features, national features. In recent years, architectural objects have rarely been built in conjunction with national historical culture. The importance of ethnic identity in a modern market economy and general globalization is gradually increasing. The core of architectural thought should be loyalty to traditions, thanks to which peoples maintain their cultural heritage.

6 Analysis of regional features and national features.

Due to the need to ensure microbiological safety, solutions for dwellings with a combined entrance, living room, kitchen and dining room become questionable. In a pandemic, the apartment entrance area should be isolated from other premises so that we can leave our outdoor shoes, clothes and other things here, instead of carrying dirt into the living functional areas (fig.4).

7 Isolated entrance in apartments

Figure 1. Functionality of landscaped spaces, walking areas, playgrounds on the territory of the house (architect bachelor Berseneva A.)

Figure 2. Layout of waste chambers with 5 waste chutes for sorting and collecting waste inside the building (architect bachelor Yanimenko D.)
4. Conclusion
Due to the introduction of quarantine measures, the question arises about the self-sufficiency of our districts and homes—their comfort, logical interconnection, energy efficiency, environmental friendliness, etc. Architects are obliged to respond immediately to these challenges of our time, because the quality of people's lives depends on it.

In summary, we can say that the introduction of the most basic public functions in the structure of the house, conducting project landscaping with in-depth analysis and consideration of the needs of different age groups, the introduction of wide terraces (loggia) and organized working area in the residential environment, the isolation of the hallways in the apartment, separate collection of waste directly inside the building, as well as analysis of regional characteristics and national characteristics in the design of residential environment will allow to upgrade the design principles of the living environment.

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