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COMPACTION OF SPACE IN CONTEMPORARY JAPANESE MEGALOPOLISES

Abstract: *Japan is one of these countries where the problem of urban overconsolidation and, correspondingly, the lack of vacant space, has been present and acute for a long time. If it is impossible to eliminate the population density and the construction boom of large cities, Japan has developed a compensatory mechanism capable of making the negative sides of high density less evident. Reduction of space manifests itself in many elements of urban development: miniature residential buildings have proliferated, capsule-type hotels, gardens and tea houses have shrunk to extremely small sizes.*

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Since ancient times, the Japanese have learned to accept things that cannot be changed, and find forms of the most comfortable and productive coexistence with this or that inevitable factor. The problem of high density was not an exception. Reduction of space manifests itself in many elements of urban development: miniature residential buildings have proliferated, capsule-type hotels, gardens and tea houses have shrunk to extremely small sizes.

Miniature residential buildings

Housing construction in big cities of modern Japan continues to follow the path of increasing density. The individual dwelling house has firmly taken its place in the space of Japanese cities. A small apartment house has become one of the leading types of projected residential architecture in Japan in recent years. Even in a very small house, architects find almost limitless use for space.

“Sora-no katachi” house (Fig.1). Its name can be translated from Japanese as a “shape of sky”. Such lyricism is reasonable enough because the view to the sky is opened from each room of the building. Division of space and multiple ways of moving inside are elaborated very unusually. The architect used the unique combination of passages inside the building. Each space has got multiple entrances and exits so even in a building this small there are lots of them. Continuous changes of direction during transitions from one room to another are also designed by the architect. This way of movement perfectly match the sense of traditional Japanese buildings: in which we open new views and perspectives when looking from different corners.

Another example is an “Ambi-flux house” (Fig.2). Introduction of this house had a lot of different goals: it had to be compact enough to be placed on the small piece of ground and it had to accommodate the function of street trade. In fact, the future owner of the house had to make a serious choice: relocate to suburbs or live in a house where the two first floors would be occupied by office areas (that part of the city became entirely commercial). Dense housing dictated the shape of a building making it very narrow and very tall.



Figure 1. "Sora-no katachi" house.
Fragment of the interior



Figure 2. "Ambi-flux house".
Fragment of the interior

The name of the building can be explained by its functions. There are two types of rooms in the building: offices (they occupy two first floors) and living rooms (on the three other floors). Offices and living rooms do not have a shared stairwell, as there are two separate stairs designed. It marks two different designations of space. Stairs on one side of the building allows moving around the shop, while the other – around the living area. Middle floor serves as a transition space.

The living area of the house is a little larger than 36 m², almost 30 m² of which occupies the first floor, while the rest of the floors are actually stairwells, equipped for housing. Most of the day the family spends on the ground floor and only at night parents go up to the bedroom. Children, apart from playing in their rooms and in the garden on the roof, got the opportunity to run endlessly through the floors, up and down, to expand the space for their exciting games to the staircase, which is equipped with a protective mesh.

In the design of the Natural Wedge House, spaces of two types have been created: one that is to change over time (or perform other functions), and a permanent one that should remain its function throughout the life of the house. A dining room, a kitchen, and a bathroom were planned as permanent. And all living rooms are able to change over time – to merge one into another to form a larger space, or vice-versa, to be divided into smaller rooms.

Small gardens

Japanese gardens have not been spared an acute lack of space too. The Japanese who can perfectly implement their artistic genius in small spaces, in recent decades have been put in the conditions of almost complete lack of space for new gardens. By the beginning of XXI century new types of Japanese gardens have appeared according to the demands of the times.

The main negative factor of modern civilization – the high city density and the fact that the modern urban environment only increases the man's alienation from nature, led to the

introduction of unusual architectural and landscape structures: the creation of vertical, multi-tiered gardens as well as roof gardens.

Nowadays, roof gardens are already very common in Japan; they are being arranged on the roofs of office buildings, residential buildings, and even garages.

Roof gardens are the only form of a modern Japanese garden that can be quite large. Gardens placed on the roofs or facades of modern buildings are designed to compensate the reduction of parks, as well as other green areas and recreational spaces in cities. The roof garden of the international reception Hall in Fukuoka Prefecture (ACROS Fukuoka) is almost twice the size of the building's footprint. This green oasis on the roof is one of a kind. Its concept is the unique combination of urban and park spaces. It contains 15 stepped terraces, by which you can climb the green cascade to the top.

The ACROS Fukuoka building is located next to the Park. That was the main concern in the discussion of the new building. It would seem that the new administrative building would reduce the area of the Park. But with the emergence of a new facility, the size of the Park visually even doubled. On each tier of the green terrace there are gardens for meditation and relaxation. The upper terrace serves as a large Belvedere: it offers incomparable views of the Bay and the surrounding mountains. Waterfalls and swimming pools are created on the terraces to minimize the noise coming from the business areas of the city.

Functions of the Japanese roof gardens extend far beyond the recreational areas. They are created not only for relaxation and quiet walks, but also for the active involvement of residents in collective events, holidays and other activities. A vivid example is the roof garden of one of the high-rise buildings of the Roppongi Hills complex in Tokyo. Since 2003, the rice planting festival has been held here. This is an absolutely special example of a public space. A small garden and a rice field are located on the roof of the 45-meter tower. The garden is called "the garden with rice fields" and provides a unique opportunity to experience nature in its life cycles and even become a participant in annual activities of planting and harvesting rice, as well as the preparation of rice cakes.

The reconsolidation of cities in modern Japan has led to the widespread use of very small gardens. Such microgardens, despite their long history, have been reintroduced in the 20th century. *Tsuboniwa* is a small garden located within a residential building (Fig.3). *Tsuboniwa* is in a Zen Buddhist temple, but for many centuries, the garden was an integral part of the area of residential complex. *Tsuboniwa* garden is a small universe. It embodies the philosophy of life and the deep desire of the Japanese to live in unity with nature even in cramped urban conditions.

Contemporary tea house

It is impossible to overestimate the role those teahouses (*chashitsu*) and the cult of tea in the history of Japanese culture. The shape and size of the tea house, which is now considered a classic, appeared in the middle of the 16th century. A Buddhist monk and the master of San no Rikyu (1522-1591), formulated the basic aesthetic principles of the tea house, based on those forms that have already existed in Japanese architecture. The tea house is a space specially created for tea ceremonies. However, according to expert Masao Nakamura, "simply following the rules is not enough to create a real tea house.



Figure 3. Garden of the "Ambi-flux house"



Figure 4. K. Kuma.
Tea house "Fu-an"

The house should not only comply with the formal requirements for the ceremony, but also have the appropriate atmosphere" (An image of..., 1998).

The architects of Japan praise such types of buildings as tea houses with great respect and interest, experimenting with construction, building materials, and their location. The tendency of decrease of space manifests itself there as well. At the turn of 20–21 centuries, tea houses attract architects' ability to conduct bold experiments to go beyond the established morphological traditions. Nevertheless, the tea house is always an artistically meaningful, symbolically designed space for tea ceremonies. Of course, architects are still attracted to the paradox of using something extremely small to connect to the inexpressibly large.

In their search for new aesthetics and artistic imagery for such building, which is associated with a particularly revered in the culture of tradition, modern architects of Japan are trying to preserve the spirit of the traditional *chashitsu* with its chamber, simplicity and conciseness. At the same time, preference is given to absolutely miniature sizes.

Tea house "Ku-an" of architect Terunobu Fujimori has a total area of only 5.38 m². Its interior follows the tradition: the empty space of the tea house has only one conditional decoration – a symbolic niche of the *tokonoma*. All symbolic components of its construction are visible: a curved path made of stone slabs of varying steps, and a difficulty to pass entrance.

Traditionally, difficulties at the entrance of the tea house were caused by the insufficient height of the entrance opening. In the Fujimori tea houses the difficulty of getting inside is increased by the hardships of the path: one needs to climb the stairs and literally "squeeze" himself through a small hole in the floor. The path to a tea house traditionally symbolizes humility and spiritual preparation for a tea ceremony.

The tea house of architect Kengo Kuma – "Fu-an" is a conditional boundary between the inner space and the outer environment (Fig.4). Fu-an was supposed to convey the feeling of a weightless body. To do so, a large ball filled with helium, was covered with the finest cloth, referring to the heavenly clothes of angels from Japanese legends. Fu-an is, of course, more of a symbolic, conceptual project.

Capsule hotels

The research of modern Japanese architects, of the optimal relation of the space size and the amount of time that a person spends in it, led to the emergence of capsule hotels. A fair assumption about the absolute minimum of personal time, which a business man needs, staying for the night in a hotel, entailed a reduction of a personal space.

The first capsule hotel in Japan – Nakagin Capsule tower, built by Kisho Kurokawa is the famous work of Japanese metabolism in architecture (Fig.5). The size of each capsule, 2.5 x 4 m, was chosen by the architect deliberately. It corresponds to the usual size of the Japanese tea room in six tatamis. The ceiling height is also small – 2.5 meters. To maintain privacy, capsules are attached facing different directions to avoid the eye contact with other inhabitants. According to the tradition going back in centuries, before entering the capsule you need to take off your shoes, as well as in a traditional Japanese hotel, and in a traditional Japanese house.

The Nakagin Capsule tower was the first step in the series of micro-space related experiments conducted in Japan. With its introduction Capsule hotel "Nakagin" not only

manifested the triumph of metabolism, but also reflected the search of Japanese architects in determining the optimal ratio of the space size to the amount of time that a person spends in it. In fact, the result of such searches was the appearance of capsule hotels – a perfect new type of hotels, which design went against the European ideas of comfort. The starting point in the creation of the concept for the new type of hotel was the fair assumption of the absolute minimum of personal time, which a constantly busy business person has to spend. Therefore, his requirements for the hotel are quite simple and modest, because they all are business related.

In the last 25-30 years, capsule hotels have spread across all major cities in Japan. They are located in the business districts of major cities and are very convenient for those who are late for a train or stay late at work, and also for visitors short of money to spend.

These capsule hotels offer guests much smaller personal space. The capsule size in all of these hotels is constant and equal to 1×2 m at height of 1 m (Fig.6) which means you can only sit or lie in your “room”. That's why they got their name "sleeping capsules". Indeed, the personal space in capsule hotels is extremely small – which is fully correlated with the minimum time that guest spends in a capsule using its direct function.



Figure 5. K. Kurokawa. Nakagin Capsule tower



Figure 6. Capsule hotel (Tokyo). Interior

The creation and layout of Japanese capsule hotels brings the problem of "space — time" to a new level of discussion. The reasoning of how to make the most functional hotel room, in which a person spends a minimum of time, has led to a dramatic reduction in personal space. The absolute combination of minimum time with minimum space is the basis of the concept of capsule-type hotels.

Conclusion

When creating even a very small residential building, modern Japanese architects find numerous options for spaceusage. Even a small house can help a person to create a rich, diverse life, can adapt to changing needs or a lifestyle of the owner. A small house is first of all created to become a comfortable home. A finished project does not limit a person, but, on the contrary, having an inexhaustible potential, opens a world of opportunities for him.

Contemporary Japanese gardens, created in extremely small spaces continue to perform their symbolic functions. The size of a garden is not crucial. As many centuries ago, a contemporary

Japanese garden regardless its size helps a person to find harmony – with nature, with the world, with himself.

In modern tea houses architects can use unusual material or unusual building location. But they always put all necessary symbolic components in a project. The focus of architectural search must be set on aesthetic and philosophical categories.

Capsule hotels appeared as a reaction to the needs of their time, clearly characterize a current trend of the reduction of space.

However, all examples that are presented in the article prove that even the most daring experiments that Japanese architects are performing creating micro-spaces do not go against traditions of this culture. Japanese architects show that it is possible to create something new only with the respect to the existing cultural values.

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