DOI: 10.23817/2023.defarch.5-1

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PERMANENT CITY – CHANGING CITY. ADDITIVE STRUCTURES REGENERATING EXISTING URBAN SPACES

MIASTO STAŁE – MIASTO ZMIENNE. STRUKTURY ADDYTYWNE REGENERUJĄCE ISTNIEJĄCE PRZESTRZENIE ZURBANIZOWANE

Abstract

Changeability is an essential character of the city. Urbanized spaces are subject to constant transformations, and decisions made in the past may often turn out to be relics of time not adapted to the needs of modern engineering. Associated issues, including the urban heat island, the urban sprawl phenomenon, or the deficit of space, make it seem necessary to look for solutions that regenerate the urban tissue. One of the alternative ways is to introduce additive structures, which can be understood as a system of temporary artefacts. Additive structures complement the urban fabric in the plane aspect – the existing flat roofs and gable walls, as well as hard-to-reach urban spaces – without interfering with the integrity of the load-bearing structure of the buildings. The main assumption of this article is to look at additive architecture from the point of view of the philosophy of architecture, engineering, technology, and aesthetics based on the comparative method.

Keywords: additive architecture, regenerative architecture, temporary structures, architectural transgression

Streszczenie

Zmienność stanowi nieodzowny charakter miasta. Przestrzenie zurbanizowane podlegają ciągłym przeobrażeniom, a decyzje podjęte w przeszłości mogą często okazać się reliktami czasu, niedostostosowanymi do potrzeb współczesnej inżynierii. Problemy związane, m.in. z miejską wyspą ciepła, zjawiskiem *urban sprawl*, czy deficytem przestrzeni powodują, że konieczne wydaje się poszukiwanie rozwiązań regenerujących tkankę miejską. Jedną z alternatywnych dróg jest wprowadzenie struktur addytywnych, które mogą być rozumiane jako system tymczasowych artefaktów. Struktury addytywne dopełniają tkankę miejską w aspekcie płaszczyznowym – istniejących stropodachów i ścian szczytowych oraz trudnodostępnych przestrzeni miejskich – nie ingerując w integralność konstrukcji nośnej budynków. Głównym założeniem artykułu jest spojrzenie na architekturę addytywną z punktu widzenia filozofii architektury, inżynierii, technologii i estetyki w oparciu o metodę komparatywną.

Słowa kluczowe: architektura addytywna, architektura regenerująca, struktury tymczasowe, transgresja architektury

1. INTRODUCTION

Changeability is an essential character of the city. Changeability is understood as the growth of buildings and infrastructure. Changeability being a continuous, additive addition, and multiplication of elements of the urban structure. It is not coincidence that the urban nomenclature refers to analogous biological phenomena that distinguish living organisms. The following phrases are often used to describe urban processes: city morphology, agglutination, building physiognomy and urban tissue (Ill. 1, 2). On the other hand, we pay attention to the dynamics of the city and the rhythm of the street. The concept of *urbomorphology*, which refers to the external and internal structure of an urban and rural organism and its genesis, was even introduced into the Polish literature by Marek Koter[1]. The richness of vocabulary already shows the multifaceted nature of the urban structure and its constant changeability. The article deals with three phenomena visible in the shaping of cities: uncontrolled and controlled development (*agglutination* of the urban structure), *multiplication* of forms, and *additive architecture*. Within these three phenomena, some of the most characteristic realizations and conceptual projects have been presented. An important element of the considerations is the look at additive architecture as a system of temporary and permanent artefacts carrying phenomena that positively and negatively affect the urban fabric. An important positive aspect is the possibility of regenerating the urban structure by introducing additive solutions in the planes of existing buildings: from flat roofs, gable walls, municipal infills to temporary structures in the spaces of squares. Negative aspects visible on a global scale are related, i.a., with the uncontrolled growth of the city, e.g., urban sprawl, deurbanization, or suburbanization, as well as with the heating of urban spaces, affecting the urban heat island.

2. FIRST URBANIZATION AND AGGLUTINATION

The first urban structures that gave rise to human settlements were spontaneously created by the additive addition of new residential units. This process is called agglutination (Latin agglutino – I glue). It is a biological phenomenon in which cells of living organisms stick together. This process, which is widely used in serology, has been transposed into architectural nomenclature. The phenomenon of "gluing" successive structures and buildings to each other can be observed, especially when analysing the outlines of the first human settlements, from nomadic structures to pioneer housing clusters. One of the oldest residential settlements where the phenomenon of agglutination is particularly noticeable is Çatalhöyük – a Neolithic settlement founded around 7400–7300 BC located in what is now central Turkey. Individual residential units were attached to each other, creating a dense carpet development. According to the approach of Peter Bikoulis, an archaeologist from the University of Toronto in Canada, archaeological research of historical residential buildings should be analysed not only in the context of the architectural and artistic-historical perspective, but also on the basis of social relations and organization of the building structure[2]. The aforementioned social relationship

[1] M. Pirveli, *Od morfologii przez urbomorfologię do morfoznaku*, "Przegląd Geograficzny" 2011, vol. 83, no. 4, pp. 507–529.

[2] P. Bikoulis, *Neolithic House and Households in Central Anatolia in multi-regional perspective*, "vis-à-vis: Explorations in Anthropology" 2013, vol. 12, no. 1, pp. 31–53.

plays a very significant role in the agglutinative way of shaping architectural objects. Individual units are not shaped as free-standing structures separated from the surroundings, but as integral residential modules closely connected with the neighbourhood. Transferring the phenomenon of agglutination to the modern language of architecture, its dynamics, and the aspect of lack of control over development are particularly visible in the structure of slums. Then, this phenomenon takes a decidedly negative connotation. Solutions that can be defined as controlled agglutination are related, for example, to the modular architecture, which, through its multiplication, is a seemingly complicated system of connections and dependencies. An example of such an approach to modular structures are the conceptual ideas of the Japanese Metabolists, as well as one of the most famous projects that changed the way of looking at modular residential architecture, Habitat 67, designed by Moshe Safdi in Montreal, Canada, erected on the occasion of the 1967 World Expo (Ill. 3, 4).

3. ADDITIVE ARCHITECTURE IN JØRN UTZON'S DESIGN

Additive architecture has become an important element of the considerations of one of the leading Danish architects – Jørn Utzon. The Pritzker Prize winner has devoted part of his design work to defining additivity in architecture, defining the module as an independent architectural component, and developing a series of concepts based on the juxtaposition of modular elements. J. Utzon emphasized that "a consistent utilization of industrially produced building components can only be achieved if these components can be added to the buildings without having to be cut to measure or adapted in any way"[3]. Additivity in architecture has existed since the beginning of the creation of residential structures. Jørn Utzon believed that both natural and cultural forms influence additive solutions. In his understanding of the idea of additivity, the shaping of modular architectural structures was not based solely on the thoughtless multiplication of modules. Referring to the anthropology of culture, in his conceptual projects and realizations one can discern the concept of transculturality propagated by the philosopher Wolfgang Welsch[4]. This transcultural specificity of Utzon's projects is embedded in time, context, and space at the same time and constitutes a progressive response to the dynamics of culture[5]. J. Utzon was fascinated by nature and the multiplication visible in its solutions. In his reflexions on architecture, its role, and the way it is shaped, he believed that one should not copy the visual aspect of nature without thinking, but look creatively at the principles and laws that lie behind it[6]. The architecture that came out of Utzon's line is mainly associated with one of his most iconic works – the Sydney Opera House, which, with

[3] J. Utzon, *Addictive architecture* [in:] Utzonphotos.com, http://www.utzonphotos.com/philosophy/additive-architecture/ (access: 29.06.2023).

[4] K. Deja, *Transkulturowość: od koncepcji Wolfganga Welscha do transkulturowej historii literatury*, "Wielogłos" 2015, no. 4 (26), pp. 87–107.

[5] M. Faleh, C. de Brigny Wall, *The Jørn Utzon Architectural Paradigm and the Emerging World Design Experience* [in:] *What Would Utzon Do Now? Fourth International Utzon Symposium, 7–9 March 2014, Sydney, Australia*, https://www.be.unsw.edu.au/sites/default/files/upload/UtzonSymposium/FALEH%20AND%20WALL.pdf (access: 29.06.2023).

[6] M.A.R. Escribano, Utzon and the sun path as an organizing element of life in a house [in:] *What Would Utzon Do Now? Fourth International Utzon Symposium, 7–9 March 2014, Sydney, Australia*, https://oa.upm.es/23173/1/Full_Paper_Miguel_%C3%81ngel_Rup%C3%A9rez.pdf (access: 29.06.2023).

its characteristic shapes that fit in with the idea of shell structures, has become a hallmark of Australia. Just as *Uluru* (Ayers Rock) is an example of nature's iconic form, the *Sydney Opera House* is an artefact of man-made architecture. Three years before the announcement of the architectural competition for the Opera House, J. Utzon designed one of his characteristic examples of additive architecture, *Romerhusene* (the Kingo Houses). In 1953, Utzon designed a housing estate in southern Sweden. He began his design work with the development of one residential module, taking into account the topography of the area and the context. Utzon described the shaping of the house building as "blossoms on a cherry branch, turning to the sun"[7]. This poetic description shows the great importance that Utzon attaches to shaping the functions of the building according to the movement of the sun. Each module is an L-shaped atrium object with the size of 15x15 m. Despite the close connection of the building structure with each other, each unit has a separate space of a private garden, optically hidden behind a layer of a brick wall. The simplicity of the form, high sensitivity to sunlight, and the materials used, including brick as the base material, are the determinants of the quality of the *Romerhusene* complex, becoming the foundation and "prototype" for another iconic housing complex, *Fredensborg Houses*.

4. THE MYTH AND UTOPIA OF THE JAPANESE METABOLISTS

Japanese metabolism, which took shape in the form of the activity of an iconic group of architects in the 1960s and 1970s of the twentieth century, referred to the analogy of biological nomenclature even in its name and the core of the idea. Agnes Nyilas in the book *Beyond Utopia. Japanese Metabolism Architecture and the Birth of Mythopia* begins its narrative with the statement that the proposals of the Metabolist conceptual architecture are not so much a utopia as a myth camouflaged in utopia. The activity of the group left a big mark on subsequent generations of architects, creating structures referring to fractals found in nature and trying to give a completely new dimension to private and public spaces, creating a new version of functionalist architecture based on the idea of multiplication and module. Looking through the book by Rem Koolhaas and Hans U. Obrist, entitled *Project Japan. Metabolism Talks* you can get caught up in inspiring considerations, ideas, and projects created by Metabolists. Extended interviews with Arata Isozaki, Toshiko Kato, Kiyonori Kikutake, Noboru Kawazoe, Fumihiko Maki, Kisho Kurokawa, Kenji Ekuan, Atsushi Shimokobe, Takako and Noritaka Tange invite you to embark on a journey in search of a new dimension of 1960s architecture. Metabolists efficiently used module and multiplication as the basic language for shaping architectural structures. Additivity appeared in many projects (conceptual and realized), becoming a characteristic way of expressing space. Arata Isozaki was not formally a member of the Metabolists, but his projects fully corresponded to the trend set by the group. Clusters in the Air from 1962 is a project of the city of the future, in which capsule modules are placed circumferentially around cylindrical megastructural elements. Similar design motifs have appeared many times in the work of the Metabolists, from the 1972 Nakagin Capsule Tower, designed by Kisho Kurokawa, to the entire spectrum of conceptual projects (Ill. 5, 6).

[7] Kingohusene by Jørn Utzon (1064AR) [in:] Atlas of Places, January 2023, https://www.atlasofplaces.com/architecture/kingohusene/ (access: 28.06.2023).

5. ADDITIVE URBAN TISSUE REGENERATION

Additivity can also have the function of regenerating the urban fabric. In compact urban layouts, there are planes that can be used to introduce additive structures. Architectural objects are increasingly being looked at from the perspective of the built-in and operational carbon footprint. Solutions towards zero- or nearly zero-energy buildings are sought. In architectural-related discussions, the narrative is often focused on sensual architecture of high functional and aesthetic quality on the one hand, and pro-ecological solutions based on energy efficiency on the other. These two narratives, however, can walk side by side, influencing each other, and constitute elements of transgression – transcending architecture as we know it. Monika Rosińska in the article: "Declarations of independence. A few remarks on nonanthropocentric speculative design" draw attention to this nonanthropocentric way of looking at the design process. M. Rosińska writes: "Dualities naturalized in language, such as culture and nature, subject and object, mind and body, emotions and reason, obscure the real entanglement and dependencies experienced in the world"[8]. From this perspective, one can dare to say that architecture can also be regenerating. The introduction of temporary structures into the urban tectonics of the city and the use of additive architecture can reactivate the urban fabric in points and have a regenerating effect on a given area or architectural object.

5.1. ADDITIVENESS AND SPACE OF FLAT ROOFS

The flat roofs found in dense urban fabric constitute an important surface, the so-called fifth façade of the city. The problem of flat roofs underutilized in urban structures and their impact on the urban heat island has been brought to the attention of the MVRDV office. In the comprehensive publication *Rooftop Catalogue*[9], designers present a range of possibilities offered by existing flat roof spaces, from solutions' typologies to construction and long-term design ideas. The publication addresses Rotterdam's spatial analysis and proposals for the entire spectrum of solutions for flat-roof spaces. MVRDV designers are known for their bold, off-the-charts architectural concepts, which can often be categorized as transgressive solutions. One of the most characteristic examples of their out-of-the-box view of architecture as structure and architecture as functionality is the 2006 Didden Village development. The project is an example of the superstructure of an existing historic urban fabric. The monochromatic blue residential superstructure provides an intense contrast to the historic bricks and the *porosity* of the existing facades. It exemplifies an overbuilt micro-world in an urban, dynamic structure.

5.2. ADDITIVITY AND WALLS OF BUILDINGS

Another space in the urban structure that is subject to architectural experimentation is the gable wall zone and extensions to expand the utility function. An important direction for the introduction of regenerative architecture is urban growth in the form of vertical and

[8] M. Rosińska, *Deklaracje niezależności. Kilka uwag o nieantropocentrycznym projektowaniu spekulatywnym* [in:] K. Kępiński, A. Krężlik (eds.), *Antropocen: w stronę architektury regenerującej. Katalog wystawy*, Narodowy Instytut Architektury i Urbanistyki, Warszawa 2022, p. 133.

[9] *Rooftop Catalogue*, Rotterdamse Dakendagen, Léon van Geest 2000, https://rotterdamsedakendagen.nl/wp-content/uploads/2022/12/Rooftop-Catalogue.pdf (access: 28.06.2023).

horizontal farms, added additively to the existing structure of buildings. One example of the use of existing gables is the concept of an urban vertical farm, *GreenBelly*. The concept involves attaching modules to the building plane to provide growth of vegetable crops available to the local community. Recycled materials have been used to shape the structure, as well as photovoltaic panels to provide electricity needs[10]. One of the most spectacular examples of expanding the living space of apartments is a 2016 project by the architecture of Lacaton & Vassal + Frédéric Druot + Christophe Hutin in Bordeaux. The concept consisted of converting three existing modernist buildings and expanding the usable space with glazed conservatory spaces, providing a functional and visual extension of the living area of all apartments. Due to this treatment, existing social housing units gained a functional *breath* and acquired unique façade tectonics. In contrast to the spectacular design of the Lacaton & Vassal team, it is worth citing the small-scale concept of *Rucksack House*, proj. Stefan Eberstadt. The project is an example of a mobile structure that can be suspended from the facades of existing buildings, enhancing the utility function of the rooms. The project balances art and architecture, form and function, playing with structure, and responding to small residential spaces. The structure provides a visual contrast to the existing urban fabric.

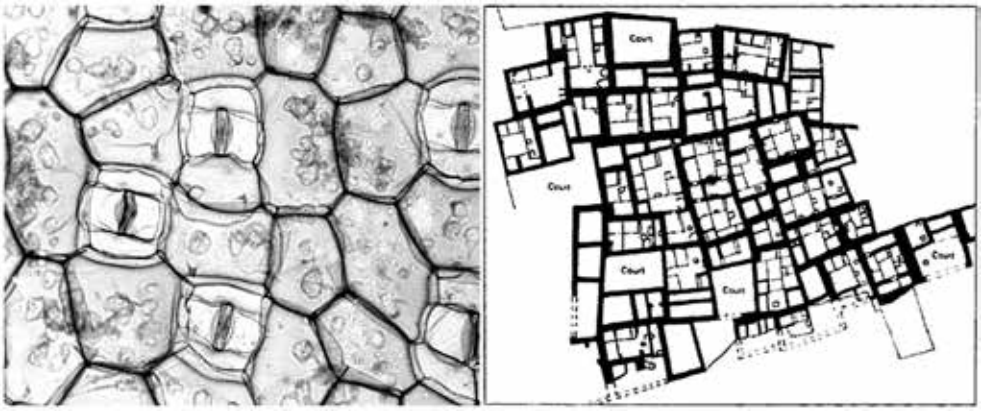
5.3. ADDITIVITY AS INFILL ARCHITECTURE

When considering the idea of additivity in the city, it is worth mentioning, as an example, urban infill buildings that fill spaces between the existing urban fabric. They can be a visually contrasting element with the tectonics of the frontage, fitting seamlessly into the structure, and filling the development gap only temporarily as a type of pop-up architecture. One of the most recent examples is a plomb building with an office function, proj. SO&CO in Tokyo. The structure of the building is a modular concrete structure that provides a surprising narrative in the street frontage. Plomb architecture is an important example of the additive nature of urban fabric and can take on a variety of narratives visually and functionally.

6. CONCLUSION

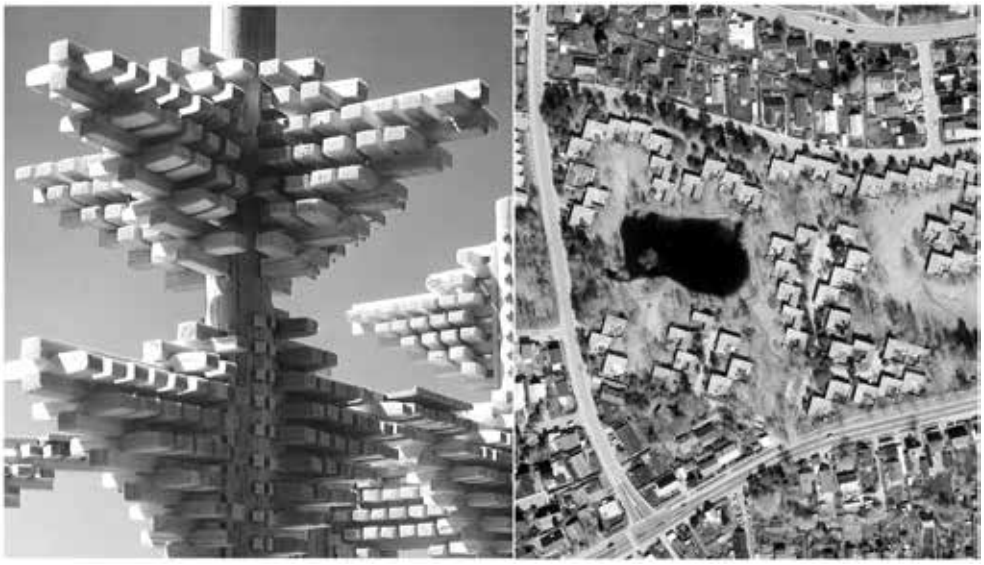
Additive architecture, its multiplication, controlled and uncontrolled growth of the existing urban fabric is one of the contemporary architectural and urban planning challenges. In an era of negative urban phenomena and ecological needs, additive structures can and should also take the direction of regenerating existing urban space. The introduction of modular structures and their multiplication can be a step toward long-term self-healing of degenerated urban spaces. The adaptation of existing flat roofs, gable walls, and spaces between architecture seems an important direction to activate the urban fabric, creating a dynamic changeable city.

[10] Vertical Urban Garden [in:] Green Belly, http://www.greenbelly.org/index.html (access: 28.06.2023).



Ill. 1, 2. Comparison of microscopic photo of organic tissue with agglutinated emerging tissue of the city Çatalhöyük. Sources: K. Wheeler, Plant stomata, https://www.sciencephoto.com/media/91320/view/plant-stomata-light-micrograph (left); J. Krygier, *Cartocacoethes: Why the World's Oldest Map Isn't a Map* [in:] Making Maps: DIY Cartography, 13.10.2008, https://makingmaps.net/2008/10/13/cartocacoethes-why-the-worlds-oldest-map-isnt-a-map/ (right).

Ill. 3, 4. Comparison of the structure of the uncontrolled sprawl of slum development in Chile with the controlled formation of the revolutionary Habitat 67 project, designed by Moshe Safdie. Sources: ŁZ, MNIE, *„Pionierskie przedsięwzięcie". Chile ma pomysł na slumsy* [in:] TVP Info, 10.12.2020, https://www.tvp.info/51260188/chile-ma-pomysl-na-slumsy (left); About Habitat 67 [in:] Habitat 67, https://www.habitat67.com/en/about/ (right).



Ill. 5, 6. Comparison of the structure of Cluster in the Air, designed by Arata Isozaki, and the Kingo houses, designed by Jørn Utzon. Sources: The City in the Air by Arata Isozak [in:] ArchDaily, https://www.archdaily.com/912738/the-city-in-the-air-by-arata-isozaki/5c7f0147284dd1cef0000295-the-city-in-the-air-by-arata-isozaki-photo (left); Kingohusene by Jørn Utzon (1064AR) [in:] Atlas of Places, January 2023, https://www.atlasofplaces.com/architecture/kingohusene/ (access: 28.06.2023) (right).

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