Skyscraper: Deceiver of vertical urbanism

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Abstract: The presence of skyscrapers in cities is a positive characteristic of their infrastructure and logistics as well as testifies to the success in the field of building technologies. The influence of skyscrapers on the life of the citizens necessitates research on this issue. The purpose of this article is to develop a more diverse and multi-dimensional agenda for understanding and researching urban verticality. It argues for the emergence of skyscrapers, the technological inventions that made this possible, the impact of high-rise buildings on the urban context and their interaction with it. It also draws attention to sociological aspects in the perception of skyscrapers and both role/status in advertising. The external and internal essence of skyscrapers, their interconnection and confrontation are considered. The question of the fullness of vertical urbanism is assessed and studied, its existence is called into question and the necessary conditions for its emergence are considered. The solutions to the main problems that arise in the contexts of vertical urbanism are proposed.

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1. Introduction

There is a stereotype that a skyscraper is a beautiful high-rise building where offices of large corporations are generally located. However, to date, high-rise buildings have become an integral part of urban planning. The presence of skyscrapers distinguishes any modern city, and the ability to build them speaks to the great strides made regarding construction technologies, the intellectual capabilities of designers, the readiness of the appropriate materials and physical infrastructure, as well as logistics. The history of skyscrapers begins in the late 19th century in America, whereby the main "staging-grounds" for these experiments became New York and Chicago (Jacobs, 2020). The Manhattan skyscraper was created in several stages between 1900 and 1910 (Jacobs, 2006; Jacobs et al., 2007). It was the result of contributions of three revolutionary urban-planning ideas that initially existed independently of each other, yet nevertheless merged together eventually: Apartment reproduction of the world; Capture of the Tower; House-block (Koolhaas, 1978).

Prior to the appearance of skyscrapers – in the era of stairs – all floors above the third were considered unfit for commercial use, and above the fifth – uninhabitable. Since the 1870s, thanks to the invention of elevators, floors began to multiply. Otis Elishema's mechanism provided access to countless horizontal planes that previously soared invisibly into a light haze of imagination, proving their superiority by introducing a – perhaps paradoxical – concept; the farther from the ground you go, the closer you actually come to what beneficial nature is left within the city – namely light and fresh air (Barr, 2007). At the dawn of the 1880s, the elevator was complemented by a steel support structure that could sustain all these newly discovered areas without taking up much space (Helsley & Strange, 2007). Thanks to the interaction of these two inventions, any plot of land could now be reproduced ad infinitum vertically, resulting in a huge volume of areas, namely, the skyscraper itself (Straße et al., 2022).

With this invention, limiting the width/growth in cities seemed plausible, by concentrating social activity in the centre – in and around skyscrapers that could accommodate large numbers of people (Borisov et al., 2021). However, the skyscraper of the 20th century did not function like this. These were private territories of one or more corporations that rented premises there. These skyscrapers may be compared to isolated medieval castles or donjon towers, which were only found within city centres, not in the hills of rural areas (Bobyr, 2021).

Despite their isolation and the hopes of urban planners, skyscrapers increased cities' population-densities and contributed to their growth in width (Astafeva et al., 2015; Platunova, 2011). Yet, skyscrapers were able to increase the number of commercial structures that previously could only exist on the first and second floor. Moreover – thanks to the elevator – conventional construction boundaries/restrictions disappeared. However, said restrictions disappearing meant that traditional boundaries of cities began to blur as well; with the increase of jobs in cities – particularly regarding skyscrapers – the residential sector began to increase to meet the actively growing demand (Shuaibov et al., 2020). Under these circumstances, commuting skyrocketed. With respect to skyscrapers, the situation exists whereby on weekends and at night the surrounding areas "die out" while during office-hours they fill up again (Robinson, 2011). During rush hours, the city's transport systems are placed under enormous strain, while during quiet hours, urban spaces are unused. In the first quarter of the 20th century in America, it was skyscrapers that gave rise to the trend of life in the suburbs; the city simply had no place left for man, it was taken over by corporations.

2. Features of the technology of building skyscrapers

M. Castells, like Harvey (2008), argues that the spatial form of a society is the mechanism for its development. Moreover, unlike Harvey (politics and economics form the city; i.e., by analysing economic and political processes, we understand the causes of this or that transformation of urban space), Castells in his first books on the theory of urbanism (Castells, 1977; Castells, 1983) develops the idea that the understanding of the processes of appearance and transformation of architectural space, allows us to understand the city itself. Hence, according to Castells, the urban environment is a symbolic and spatial fixation of the action of wider social forces. Skyscrapers, for example, are initially built-in anticipation of greater profits, but they also "symbolise the power of money over the city through technology and self-confidence; they are temples of the period of industrial capitalism growth" (Castells, 1983).

All over the world, high-rise buildings are privately ordered and built to maximise land-economy: each floor brings almost as much benefit as a single-story house of the same area. Skyscrapers are usually erected in city-centres, where the most expensive land is. The higher the building, the more dividends it will bring to future owners. In this context, skyscrapers turn out to be giant buildings, symbolising an era of maximised profit per square meter; an era of new technologies that have made it possible to explore and conquer airspaces (Gassner, 2017). Each high-rise building tries to stand out, because it is a unique visual brand, advertising which is visible throughout the city, for which you do not have to pay constantly – simply the one-time construction fee (Garnaut, 2020; Khoroshkov & Derevianko, 2021). However, like all advertising, sometimes there may exist fraud: for example, many oil corporations are located in modern ecological skyscrapers, which have a great

importance and influence on the image of the company, despite the fact that they do not have very environmentally-friendly businesses/production.

Skyscrapers have the strongest impact on the inhabitants of cities; they mesmerise with their majesty. Nevertheless, owing to their expense they are "vertical sprawl", archipelagos of "vertical gated communities" – solipsistic capsular spaces for elite groups – upwards into the sky (Barr, 2008; Harris, 2015). Many companies seek to rent premises in skyscrapers to gain status. Along with offices, some floors are given to elite housing. Yet, despite the already-high demand, developers are actively ramping up interest within the community through clever advertising and catchy slogans. For example, in Mumbai, you can find billboards with inscriptions like: "The same address as God", and "The higher you go, the cooler you get" (Graham & Hewitt, 2012). The skyscrapers are most assuredly cosmopolitan. Very rarely do they contain the cultural realities of their location. They are more like the citizens of the world. The general disadvantage of these tall buildings is that their design does not take into account local traditions and historical framework. Thus, any tower makes the urban environment look homogeneous, ignoring identity/culture. Despite skyscrapers being perceived as the next step in progress, the authorities casually demolish buildings to make way for their construction, often ignoring the historical monuments located in the selected areas.

Notwithstanding their symbolic nature, skyscrapers are not only the "hallmark" of a brand or a city – not only the appearance is fundamental. On the contrary, the technology of building skyscrapers is mostly based on ancient Roman architectural tradition. One may recall Vitruvius' treatise "Ten Books on Architecture" of the 1st century BC and his main covenant: firmitas (strength), utilitas (utility), venustas (beauty). The order in which these qualities are listed is paramount. As we can see, beauty comes in last, while strength and utility are far more important. To understand these qualities more deeply, it is worth looking inside the skyscraper and considering its structure.

Koolhaas (1978) formulated the "1909 Theorem" in which he described the essence of the entire content and character of the skyscraper: "By 1909, the promised rebirth of the world announced by "The Globe Tower" … is a theorem that gives an ideal characteristic of the skyscraper: a slender steel structure holds 84 horizontal sections, all the size of the initial (original) piece of land. Each of the artificial levels is represented in its original form as if there were no others, and represents a strictly private kingdom of a lonely village house and related structures, stables, servant cottages, etc." What happens at the levels is so unrelated to each other that they are not even thought of as being part of a single scenario. The separation of the airframes clearly contradicts the fact that together they form a single building. The scheme strongly suggests that the entire structure reaches exactly the size where the individuality of the platforms is preserved and developed. Thus, success must be measured by the extent to which the structure distinguishes the coexistence of the platforms, without any interference in their destiny. The building becomes a series of private seclusions; the function of each individual platform cannot be predicted in advance by its design (Bonakdar & Audirac, 2020; Marzouk & Othman, 2020).

Henceforth, an unexpected and unstable combination of simultaneous/synchronous activity is placed – theoretically – in each section of the metropolis. This leaves much less to the architecture in the functions of foresight, compared to what it used to be. Furthermore, the creation of layouts becomes the action of limited prediction; Public opinion begins to drive architects into the trap of a lack of variation – the ideal has already been found which meets the modern requirements of business, politics, etc. Unfortunately, very soon this form crystallized to the extreme – roughly speaking, only the frame and glass are left. As a result, the architect's creative work was boiled down to the idea of a general form/outline.

In these realities, it has become impossible to predict the use of the system: due to the uniformity of all floors, anything can happen on them at different times. This situation in the design is the exact opposite of what existed before: the future functions of the building had always proceeded form, respectively determining the construction's shape and appearance. Originally, skyscrapers had no inherent function associated with their future life (Mitchell, 2012). This, in turn, generated a new trend – the renunciation of private property and the transition to leasing. From the outset, a multifunctional space is created that is functionally so simple, it fits almost any societal needs.

The theorem of the 1909 defines a skyscraper as a utopian formula for an unlimited number of pristine places in one urban area. Since each of these places must find their own programmed fate beyond the architect's control, the skyscraper becomes an instrument of a new form of unrecognizable urbanism. Despite their physical unity, the skyscraper is a great destabiliser for the metropolis; it carries with it a timeless programmed instability. This unpredictability is very frightening to any urban planners, as there is a "Brownian motion" which is not subject to the awes of mathematics and the principles of rationality (Bernard, 2014). After all, this is the fundamental basis in traditional urbanism – everything must be clearly calculated and the city must exist according to prescriptive scenarios – any deviation indicates the failure of urban theories.

3. Sustainable urban life in skyscraper cities

From the perspective of the proponents of traditional urbanism, skyscrapers destabilize the urban space. Yet, if you take a look at this phenomenon from the other side, they

dynamise it, as these types of buildings – within a short time-span – adjust to the new trends, thus forcing the surroundings to change under them. In this case, it is skyscrapers that become the catalyst for change. Skyscrapers are like 'litmus paper' in the city that announce the necessary changes, and they are the first who respond to them (Bharne, 2011; Gottmann, 2020). This awareness fundamentally changes the role and perception of the skyscraper in the city. From a business perspective, skyscrapers are faithful "guardians" of centralisation. However, by centralising inside, they actively decentralise on the outside. This idea is key – the external and internal "politics" of the skyscraper contradict each other. Considering that a skyscraper most often occupies an area no less than a whole city-quarter, lobbies inside skyscrapers become competitors to real quarters. Moreover, these skyscrapers are so large that they are perceived as a new town with a population (for example) of 16000 people spread across 39 floors. In this way, the city begins to consist of multiple towns. A skyscraper is a town within a city. As such, directive management in cities becomes impossible; the mayor's vertical power is lost. The skyscraper is both a "citizen" of the city whilst simultaneously declaring its independence – a rebel, an anarchist.

For traditional urbanism, the skyscraper is an evil, yet for the economy and "inhabitants" of this "fortress" – the skyscraper is a bulwark. Quarters with skyscrapers create zones that do not necessarily follow contemporary city-directives. As a result, "… it is a challenge to rethink our perspective on the significance of the vertical zones they index as contexts for specific patterns of architectural design, or types of interaction between people, or people and the city itself" (Ireson, 2000). Thanks to the emergence of some real 'heavy hitters' in cities – skyscrapers – a new term has appeared in urban theory; vertical urbanism. Nonetheless, the question arises if vertical urbanism really exists. It is not clear if a "sufficient number of floors" is enough to occupy space in the third plane for vertical urbanism to emerge. Despite the active destabilization of space around the skyscraper, it remains consistent inside. In today's world, there is practically no real vertical urbanism. This may simply be referred to as the tumours of horizontal urbanism. It is just cells, most often with only one type of function, which have a huge load on the horizontal plane. They are alike to suburban hypermarkets, only occupying space in the vertical plane, not in the horizontal one.

"Linking the city to the concept never makes them identical, yet it plays on their progressive symbiosis: to plan a city is both to consider the very plurality of the real and to make that way of thinking the plural effective; it is to know how to articulate it and be able to do it" (Certeau, 2011). Urbanism is about diversity, about satisfying human needs that only the city can provide. In the context of the 2020 pandemic, skyscrapers have been completely emptied, entire areas occupied by them have been turned off from the urban context, while vertical urbanism had evaporated at one point. However, it would not have happened if a skyscraper – as a real town unto itself – were designed inside as a mixed-used 'building' including offices, apartments, a fitness centre, stores, etc. All this would have given rise to real vertical areas, that would have worked for the benefit of both small and large cities – the skyscraper and the city in which it is located, respectively. In this case, skyscrapers could isolate themselves from the city proper, while life in the 'town' would not stop. The skyscraper would take advantage of its medieval principle – a defensive structure and act as a buffer zone until people in their own apartments were completely isolated.

Although everything is much simpler in theory, in real life there are many factors to consider, including socio-economic and natural aspects, etc. For example, the state and society are very reluctant to agree to such projects; only very wealthy people can afford to live in skyscrapers; the construction of skyscrapers emits a lot of carbon dioxide, which affects global warming, etc. However, many of these problems have their solutions (Smirnov, 2019):

1. The construction of skyscrapers can be beneficial not only to their owners, but also to the authorities and the residents of the city, as very often a deal is made between the authorities and the owners, one of the conditions of which is the additional improvement of adjacent areas to the future object, in particular the creation of new public spaces.

2. The business structure is fundamental in the skyscraper, so everything must be "built" around it. In this context, apartments located in the skyscraper should not target everyone, but only the employees of firms working in this building. At the same time, all apartments should be rented out (prices would be regulated by the building owners or tenants/lessees), without the possibility of purchase and privatisation. This, firstly, would reduce the burden on the city by reducing commuting and carbon emissions. Secondly, it would allow the skyscraper to live a full life without stagnation; as, after dismissal, employees would vacate the apartments thus opening these places to their successors.

3. The problem of unsustainable construction mostly dates back to the 20th century. High-rise buildings consume significantly less energy than low-rise buildings, and modern skyscrapers are more environmentally-friendly than all other buildings. In fact, many of them are self-sustaining, which is beneficial to the entire global ecology. It also means decentralisation and anti-monopoly in this area. This reiterates an independent town within another city; including with respect to the conditions of cataclysms and epidemics, this is an especially useful factor. Moreover, eco-friendliness is

not the only merit of high-rise buildings, as it is skyscrapers that are the innovators of many modern technologies in completely different fields of science – ranging from rooftop gardens, green walls and multi-storey greenhouses as part of new verticalized forms of urban horticulture and agriculture (Hill, 2017; Sadik-Khan, 2016; Rose et al., 2010), to carbon-fibre rope technology which allows elevators to ascend safely to 1000 meters in one go (Graham, 2014) and to not burst in case of fire.

"The pursuit of height is indicative of the worship of power and capital. Only if cities around the world free themselves from the competition for height and the mania for technology, and treat people as the main object of concern, while caring about humanity and nature, can a new and humanistic urban civilization be remodelled" (Hayano et al., 2014). Skyscrapers – shaped like towers – are city beacons, however instead of ships they attract people (Moon & Miranda, 2020; Tupenaite et al., 2021). By attracting people with its facade, it is important not to disappoint with its interior. Moreover, this is the place where the concept of New Urbanism is applicable, because the total area of all the floors of the skyscraper is the same size for which it is best suited. The higher the building is, the more the architects will focus on creating a city within it – and only then will it really be possible to announce the beginning of vertical urbanism.

4. Conclusions

Public opinion begins to actively oppose the development of the skyscraper industry, as people simply do not see a need for it. In order for vertical urbanism to become a reality and to develop into a multi-levelled city, skyscrapers must stop embodying medieval donjon towers, they must become real participants of urban life, letting it into their inner spaces. The skyscraper has turned out to be too much of a "strong player" in the city. Obviously, any city needs diversity, so skyscrapers must provide a wealth of opportunities, mobility and become an entire self-contained ecosystem.

Conflict of interest

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