Effects of Current Sunlight Exposure Regulations on New Housing

Catalina Bocan 1, Dragos Bocan 1, Alexandra Keller 1

1 Faculty of Architecture and Urbanism, Politehnica University of Timisoara, T. Lalescu Street 2A, 300223, Romania
catalina.bocan@upt.ro

Abstract. Building new living spaces is one of the most profitable and emergent industry in Romania, the European country with the greatest percent of private apartments. This is still a consequence of a former restrictive political regime (the communism) regarding the national housing politics with its standard prefabricated living units arranged in closed patterns. The political changes that followed 1989 meant also specific legal regulations in the construction field, concerning all aspects needed to have more comfortable buildings, especially for living. Main aspects such as land occupancy percentage and usage coefficient, adaptability for people with disabilities and elevators, orientation, sunlight, green and parking spaces are treated in different legal acts, sometimes contradictory. One of the most difficult acts to follow, especially in the narrow urban spaces, is the latest Order from Ministry of Health (no. 119 from 2014), regarding public health standards for the living environment of the population. This norm defines that any new building should ensure at least 1 ½ hours direct sunlight (through exterior windows) during the winter solstice for all bedrooms and living rooms of the new building as well as for all the neighbouring ones. Above this, if the distance between the neighbouring buildings is smaller than the height of the tallest one, a sunlight study must be done to prove that the required direct sunlight is possible. This paper aims to show that these specific restrictions will have a major impact on new urban living spaces in the near future. There are lots of situations given by site conditions or neighbouring buildings in which planners of new constructions will not be allowed to place living spaces on two or three facades (those from the North and partially from the East and West). This is a challenging limitation for urban planners and architects, especially given the new climatic environment, which makes southern bedrooms quite uncomfortable during summer. By studying some examples from Romania that respect this controversial article, compared with other European cities with an emerging housing industry, the scope of this study is to find solutions both comfortable and urban possible.

1. Introduction

This paper, through analysis on specific legal requirements and applied examples shows that a too restrictive legislation might have a negative impact on future urban spaces and buildings. A different approach on some restrictions, considering external factors as climate changes, different use of living spaces, working from home, should be taken into consideration for the next legal acts.

2. Romanian housing constructions before and after 1989

The result of the Soviet political regime interfered with the Romanian construction industry during the socialist period is characterized by industrialization and prefabricated concrete large panels blocks [1], dispersed in large cities. A limited number of standardized buildings appeared in starting 1960’ with a
major change in design after the 1977 earthquake. The same width of different block types allowed many combinations, but the general image was quite similar, no matter the region, the city or the orientation provided. The property issues differed from the Soviet (USSR) point of view [2], with a major impact over the collective housing buildings after 1989, when the inhabitants bought more than 98% of the apartments.

Major urban territories have been organized in closed patterns, with buildings disposed parallel with the accessing streets and the middle space between them (the “rear” facades occupied with ground improper garages or parking spaces. There was no concern for room orientation considering sunlight but the land occupancy percentage was small and the number of cars also limited. Some social facilities (school, sport hall, nursery) were placed in the neighbourhood.

2.1. Examples of the communist period blocks

One of the best examples of the first urban intervention on a large scale for collective housing in Timisoara, known as Dacia district (figure 1), starting from Circumvalatiunii road to north-west [3]. Most of the constructions have five stories (they don’t have elevators) and there are some accents with eleven stories, interior staircase and a small elevator (not for the disabled usage).

![Figure 1. Aerial and bird’s eye view for Dacia district, © Google Earth and Bing Maps](image)

Another example is also from Timisoara, called “Soarelui” district (figure 2) and built in 1980’. Here, the same model with closed pattern prefabricated blocks is used, but there is considerably less free space between buildings and more cars present, only five levels constructions.

![Figure 2. Aerial and bird’s eye view for “Soarelui” district © Google Earth and Bing Maps](image)

2.2. Examples of blocks built after 1990

After the end of the communist regime, the emerging capitalism in Romania led to new developments from real estate developers, more interested in higher profit on each sold square meter than offering better living conditions. Blocks with many stories, often squeezed one into each other, appeared on empty fields, mostly at the exterior limits of the cities. The common facilities are missing, the number of cars is continuously increasing and the streets are crowded if not blocked completely at the rush hours.
Two examples, from different cities (figure 3 and figure 4) show similar characteristics. The increase of land occupancy percentage and usage coefficient meant the introduction of complementary functions for living on the ground floor, but in reality, these neighbourhoods look more crowded than the old ones.

Figure 3. Aerial and axonometric view from Timisoara, Alexandrescu Street, © Google Earth, [4]

Figure 4. Aerial and bird’s eye view from Bucharest, Militari district © Google Earth and Bing Maps

3. Legislation and specific requirements
Legal regulations in the construction field [5] were updated after 1990 or newly released, concerning all aspects needed to have more comfortable buildings, especially for living. Main aspects such as land occupancy percentage and usage coefficient, adaptability for people with disabilities and elevators, orientation, sunlight, green and parking spaces were treated in different legal acts, the first of them being Law no. 50/1991 regarding the authorization of the execution of the construction works (periodically revised and complemented with methodological norms of applications) and the second one the Government Decision no. 525/1996 for the approval of the General Urbanism Regulation (known as HG 525 / 1996).

Later, more specific norms were released in order to detail the general aspects treated in the above mentioned documents, such as: technical regulation "The norm for designing housing buildings", NP 016/1997 (revised and renamed NP 052/2002), technical regulation "The Norm for adapting civil buildings and urban space to the requirements of people with disabilities" (revised in NP 051/2013), the Order from Ministry of Health (no. 536 from 1997, replaced with no. 119 from 2014).

3.1. HG 525 / 1996, Law 50 / 1991 (revised) and its application norms
The General Urbanism Regulation establishes compulsory norms for both design and execution of all buildings through national territory, regarding even positioning, accessibility, orientation, land occupancy percentage (POT), orientation of specific spaces, necessary parking and green spaces. Regarding the housing function, the land occupancy percentage differs considering number of stories, additional function, urban or rural area. The position shouldn’t be near heavy traffic roads or polluting sources and the north orientation of bedrooms is recommended to be avoided. The parking
regulations differs for collective housing than individual ones, but usually the local regulations (from each city hall) asks for more places than in this norm.

The Law 50 / 1991, in its latest form of application, requires the approval of neighbours when a new building near of an existing one may cause a damage to hygiene, health or the environment by affecting the level of sunlight for the existing construction. A sunlight study is necessary to prove that a new building doesn’t overshadow the vicinity.

3.2. The norm for designing housing buildings, NP 052 / 2002
This document treats all the issues concerning housing through the quality requirements, as stated in Law no. 10 / 1995 on quality in construction (also revised): structural stability, operational safety, fire safety, hygiene and environmental conditions, thermal and hydro insulation, noise protection. The hygiene, human health and environmental protection requirement means to ensure the following technical conditions: air and water hygiene, waste water and garbage disposal hygiene, sunlight and lighting, indoor comfort (temperature, humidity, acoustics, etc.).

Regarding the sunlight issue, this norm states: a house / apartment should be so positioned and oriented that at least one of the living rooms (bedroom or living room) to receive direct sun radiation (on 21st of February or 21st of October), at least 2 hours per day under minimum angles (min. 6 ° for the vertical angle of incidence and min. 20 ° for the horizontal angle of incidence of direct sunlight).

3.3. Orders from Ministry of Health (OMS no. 536 / 1997 and no. 119 / 2014)
The first Order from Ministry of Health (no. 536 / 1997) regarding hygiene standards and recommendations on the living environment of the population states the following: the location of the housing buildings must ensure direct sunlight (through exterior windows) for a minimum of 1 ½ hours daily in the winter solstice of all living spaces (living rooms and bedrooms). The distance between buildings must be higher or at least equal to the height of the highest building in order not to shade each other. The later Order from Ministry of Health (no. 119 from 2014), completes the above rule with same requirements for the new building as well as for all the neighbouring ones. Above this, if the distance between the neighbouring buildings is smaller than the height of the tallest one, a sunlight study is necessary.

The interesting part is that there aren’t any norms concerning a sunlight study, even if it is necessary in certain cases. Any designer (architect, engineer, etc.) can use specific computer software in which, by introducing the specific location (global position and data, existing and proposed 3D buildings), is able to prove or not the favourable facades for living spaces.

4. Sunlight studies applied on urban developments
In this chapter, there are presented some real estate developments (4 study cases), regarding collective housing new blocks, with their own sunlight study and plan disposal of living spaces. Each construction was studied in its urban environment, with the neighbouring buildings. The sunlight study presents certain facades and specific hours considering the winter solstice and the city global position.

4.1. Study case 1
The first case presents a block with its structure built during 2005 – 2010, not finished yet, right now being under a new study for smaller apartments, as the real estate market requires. It has a rectangular form, 12 stories, the long side being oriented East-West and 3 small building nearby (on the north, west and east side).
4.2. Study case 2
The second case study presents a new development, with the urban plan approved in 2016 [4] and the buildings actually under construction, with apartments already sold by the developer. The “U” form of the building tries to solve the matter of direct sunlight by introducing small angle cutting plane on the northern side (figure 7).

The sun study reveals that are quite small chances to get direct sunlight on the mentioned facades and the only possible interior spaces places on these are not the living ones. The plans of some apartments show large other spaces (kitchens, dining rooms, offices, dressing rooms) positioned on north elevations.
4.3. Study case 3
Another study presents the first block (from a group of four) built during the last three years, positioned central in the city and having nearby some old tall blocks (on the north-west side). The size and orientation of all elevation was established during the urban plan that preceded the execution, when the sunlight study was required.
That sunlight study was confirmed in the next phase of the project, the building permit, even more, the internal spaces being positioned in order to respect the norms from OMS 114 / 2014. All the bedrooms and living rooms are oriented according to this strict national norm.

Figure 10. Study case no. 3, current level plan

4.4. Study case 4
The last study presents two different phases of the same project. The urban plan approved in 2017 presents a sunlight study related with a possible disposal of the buildings according to the implant area established through the documentation. The sunlight study presents only the east-south-west oriented facades, but the long north elevations cannot accommodate living functions (figure 11).

Figure 11. Study case no. 4, urban plan with buildings proposal and sunlight study
The sunlight study performed on the next phase, when another developer tried to develop housing units on half of the field studied at the urban scale and the result is completely different from the first study and proposal (figure 12).

![Figure 12. Study case no. 4, second phase plan with buildings proposal and sunlight study](image)

5. Results and discussions
All these specific restrictions, if continued to be applied on a large scale will have a major impact on new urban living spaces in the near future, because there are lots of situations given by site conditions or neighbouring buildings in which planners of new constructions will not be allowed to place living spaces on two or maybe three facades (those from the North and partially from the East and West).

A deeper analysis on the different interpretation of this single issue, such as direct sunlight of interior living spaces should raise discussions between different people involved in the matter: real estate developers, designers, architects, authorities, Health Minister Specialists, even inhabitants of the apartments.

5.1. National examples
The presented study cases are just a small drop in the large mass or nowadays housing buildings, especially in large cities, where there is a new economic boom and massive population migration, after the first boom ended abruptly in 2008-2010. The need for more and more apartments doesn’t usually mean to build in accordance with legal restrictions, but attempts to construct on every single buildable land.

The real estate developers don’t usually understand the architect and the fact that anything isn’t always possible, their request is just for more saleable area and if possible smaller apartments. Their pressure on authorities is translated sometimes in bad urbanization with no concerns for public spaces, parking facilities or green spaces nearby.

5.2. Vienna
One of the emerging new districts in Vienna, Seestadt, was developed through the last years from zero and only a small part of it is finished [6]. Most of the housing constructions are developed aligned with main roads and pedestrian internal streets, together with outside common spaces between them and a general parking underground [7] (figure 13).
The facades are oriented randomly according to urban closed patterns as in the masterplan. The interior living spaces are exterior connected with main streets or common spaces (figure 14), the sunlight not being a major concern is this project [8], the accent being put on energy efficiency.

6. Conclusions
The different regulations presented above with specific articles considering the sunlight issue on living units are positioned on different steps of our hierarchy of legal norms: HG 525 / 1996 is one step stronger the Law 50 / 1991 (revised) with its application norms and 2 steps higher than OMS 119 / 2014. The strict application of the most restricted one (OMS no. 119 / 2014) as requested through the agreements phase from specific authorities before obtaining the building permit is leading to some architectural solutions with internal space problems.

The study of sunlight and exterior windows orientation in different parts of the globe for housing constructions may conclude that the continuous evolving needs and changes of people's apartment usage [2] require to bring an up to date to all the linked legal regulations.

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