Use and spatial efficiency of housing facilities and their influence on overall user comfort in blocks of flats in the Czech Republic

D. Kutá & J. Česelský
Faculty of Civil Engineering, Department of Urban Engineering, Technical University of Ostrava (VSB-TUO), Czech Republic

Abstract

An essential requirement in the Czech Republic these days is to increase the sustainability of new and existing buildings and to increase the benefits of their future use. This especially applies to houses and flats, where the demand for user comfort and spatial efficiency is rising. When evaluating the complex quality of buildings from a wide array of sustainability criteria, a traditional assessment focuses on the economic issues, however, according to contemporary trends, this is no longer enough. Therefore, we need to assess a building also from the social and cultural view, possibly during the whole life cycle of the building. From the social and cultural view, user comfort plays a key role. User comfort and efficiency have so far been dealt with only with a focus on the flat alone, whereas, the other areas of blocks of flats were neglected. Therefore, this article focuses on the facilities in blocks of flats and their influence on the overall user comfort in blocks of flats.

Keywords: block of flats, housing, flat, facilities, user comfort, usability, efficiency, housing fund, demands for housing, Czech Republic.

1 Introduction

Dwelling is a fundamental human need; it is a complex social phenomenon, reflecting any change in transformation of society and economics significantly. Dwelling issue does not only include designing and construction of a dwelling place but also the housing policy, responding to problems and requirements of the society. The main objective of housing policies of all countries, regardless
of political, cultural, social or economic differences among them, is to provide their citizens with adequately good-quality and available housing. Housing, family, family or multi-family houses, residential environment, are topical and often discussed problems of the contemporary society.

In 2011, the housing stock in the Czech Republic included 4,756,572 flats in sum, which compared with 1991, represented an increase by almost 680 thousand (16.7%) [1].

Table 1: Development of housing stock between population censuses in 1991 and 2011 (source: www.czso.cz).

| Houses, flats, type of house | Population census year | Growth index (in %) |
|-----------------------------|------------------------|---------------------|
|                             | 1991 | 2001 | 2011 | 2001 | 2011 | 2011 |
| Houses total                | 1,868,541 | 1,969,018 | 2,158,119 | 105.4 | 109.6 | 115.5 |
| Family houses               | 1,605,227 | 1,732,077 | 1,901,126 | 107.9 | 109.8 | 118.4 |
| Residential buildings       | 228,566 | 196,874 | 214,760 | 86.1 | 109.1 | 94.0 |
| Other buildings             | 34,748 | 40,067 | 42,233 | 115.3 | 105.4 | 121.5 |
| Flats total                 | 4,077,193 | 4,366,293 | 4,756,572 | 107.1 | 108.9 | 116.7 |
| In family houses            | 1,795,462 | 2,005,122 | 2,256,072 | 111.7 | 112.5 | 125.7 |
| In residential buildings    | 2,244,947 | 2,310,641 | 2,434,619 | 102.9 | 105.4 | 108.4 |
| In other buildings          | 36,784 | 50,530 | 65,881 | 137.4 | 130.4 | 179.1 |

Living in multifamily houses in the Czech Republic refers to a significant portion of the total number of inhabitants. The contemporary society endeavours after general availability of dwelling, enhancing its quality which was mostly left at the level of “panel building” housing estates in the years of 1950–1990.

Panel building took place predominantly in the years of 1950–1990 and at present, the panel building in the Czech Republic represents a third of all permanently inhabited multifamily houses; it is necessary to tackle the problems in more detail than so far and deal with effective solutions. The number of buildings built of pre-fabricated concrete blocks in the Czech Republic reaches almost 200 thousand. The quantity of flats in the buildings is 1.2 million, which is roughly 55% of all flats in residential buildings and approx. 30% of flats out of the total housing stock in the Czech Republic [1].

Panel buildings were built in construction systems, varying mainly in dimensions of wall elements, in types of service cores, in eventual heat cladding and according to the year of building. Furthermore, the systems modified into variants according to their original locality. The most used panel building systems in the Czech Republic: BANKS, B 70, G 57, HKS 70, Larsen and Nielsen, OP 1.11, OP 1.21, PS 69, PS 69/2, T 06 B, T 08 B, VVÚ ETA.

The contemporary condition of reconstructed panel buildings is satisfactory in terms of energy saving but it is due to application of standard economy measures and often due to one-sided view of the matter, the total reconstruction of residential buildings in light of internal lay-outs has not yet been considered for years.
While in the 1960s and 1970s, the construction of residential houses of prefabricated concrete blocks prevailed, primarily the construction of panel houses with a large number of flats, this proportion has been changed slowly since the beginning of 1980s. Since the mid-1990s, the construction of family houses has prevailed. Growing interest in family living in one's own house supported new building round large cities, but it was also reflected in reconstruction and resettling of family houses that were only used for recreational purposes in previous decades. The trend was changed in inhabitation. While the number of
inhabited family houses was gradually declining in the period of 1961–1991, the tendency has been opposite since 2001 [1].

At the time of construction of blocks of flats it used to be common to design and frequently use these house facilities, they rarely play their originally intended role now. The concept of a building should always be a natural response to the needs of the users, who however change their needs during the course of time. The question is whether house facilities should be absolutely limited by firmly prescribed rules, as the norms have it, or if we should rather focus on real benefits and respond to the changing needs of the user. Before designing the house and flat layout we need to clarify the requirements for the operation relationships, functional and special requirements. Therefore we need to think about the usability and spatial efficiency of the select areas of house facilities, especially the rooms for baby prams, bicycles and invalid chairs, storage rooms (unless a storage room is part of the flat), which are defined by the norm ČSN 73 4301 about housing in the Czech Republic as mandatory for ensuring the economic and technical operation of a residential building [3]. We also need to understand that when developer companies decide about facilities in a block of flats, their objective is especially to maximise the profit from their investment.

2 Interior facilities in residential buildings

The quality of dwelling is created by personal dwelling space, the nature of surroundings, public areas and by creation of conditions and background for activities and actions related to dwelling. Other additional functions and services necessary for good quality living such as parking lots for cars or facilities are solved. It is necessary to design the facilities for provision of economic and technical operation of residential building. According to ČSN 73 4301, residential buildings are defined as mandatory area of the facilities such as the area for storage of prams, bicycles and wheel chairs, rooms for storage things that are not part of the flat, the space and equipment for heating in buildings with central heating, the space for fuel in buildings with local heating, the space for storage of unobjectionable garbage in terms of hygiene and fire prevention, lay-byes and parking areas, garage parking for passenger cars. Residential buildings may have other premises and facilities namely a housekeeping and storage room, a cleaning room with sink and hot water outlet, linen drying room perhaps even laundry and ironing room, the facility for beating carpets, an assembling room for inhabitants with multi-purpose utilization, customization of flat roofs for recreational purposes or for linen drying. These premises, primarily the space of basement compartments, common rooms for storage of bicycles and prams should be a frequently discussed topic in designing of new residential buildings and during the reconstruction of buildings.

While in the period of development in housing estates it was common that a basement compartment, among others, was designed in each new residential building; these premises serve now for other purposes in the better case. The initial intended function of these premises was to store food, preserves or various
clubs could have established clubrooms, workshops or fitness centres in larger premises. Times have changed during the last several decades. Due to the fact that food is more easily available in a supermarket and shopping frequency has changed, it is not necessary to store less durable food at the expense of its shopping frequency. Also thanks to social integration of inhabitants, within hobby groups and clubs into multi-purpose buildings, it is not necessary to build them in the residential building premises.

According to the rule of the house, it is clearly defined how the residential building appurtenances should be utilized. The residential building facilities are only used for purposes corresponding to their operation and intention so that the rights of other tenants in the house cannot be limited. Placing or storage of any objects is not permitted in collective rooms except for those for which the spaces are designed (e.g. prams in pram room, bicycles in bicycle room, etc.). For this reason, one of the residential building premises that retained its function are the rooms for storage of bicycles and prams.

In a number of residential buildings, the premises are not utilized at all. This can be utilized for the establishment of the above mentioned functions and services for cheap rent. But the settlement on utilization of empty premises with owners is crucial. However, with the current increasing trend towards the utilization of bicycles in traffic and creation of new cycle paths, it is surely more suitable to find solutions for utilization of these premises that would be aimed at supporting the initial plan for utilization of these premises for storage of bicycles.

Generally speaking it can be said the facilities are an important part of the residential building – it can largely influence the convenience of living in the building. The implementation of premises for placement of the facilities increases simultaneously the costs for construction and these are negatively reflected in the dwelling unit price.

3 Evaluation of user convenience in residential building

The fundamental requirement of the present time in the Czech Republic is increasing the sustainability of new and existing buildings and increasing their future benefits. This requirement applies primarily to a group of housing stock and residential buildings where demands for user convenience and spatial effectiveness are growing. Within the scope of evaluation of comprehensive quality of buildings in light of a wide range of sustainability criteria the traditional evaluation is primarily focused on economic aspect of the issue but these evaluations become insufficient with contemporary trends. Therefore, it is necessary to evaluate a building also in social-cultural point of view namely within the entire life cycle of the building. It is user convenience that plays an important role in social-cultural sphere. However, user convenience and effectiveness have been solved so far with focusing on the dwelling area and other areas in residential buildings have been overridden.

The purpose of user convenience evaluation according to SBToolCZ Methodology for evaluation of residential buildings is the evaluation of a number
of aspects in the field of healthy and good-quality dwelling. It includes also the evaluation of bicycle and pram rooms as well as basement compartments being evaluated pursuant to storage area safety and standings according to which the areas are given the so-called credits based on which the user convenience is then determined.

Table 2: Table for evaluation of bicycle and pram rooms and basement compartments (source: SBToolCZ [4]).

| Item                      | Description                                              | Credit |
|---------------------------|----------------------------------------------------------|--------|
| Safety of storage rooms   | Individual threat of damage, theft secured location     | 10     |
|                           | Acceptable threat of damage, theft - individual only     | 5      |
|                           | Unsecured location without control and possibility of control | 0      |
| Position of storage rooms | In building – individual basement compartments (condition is sufficient) | 10     |
|                           | In building – individual garage                          | 10     |
|                           | In building in reserved common area                      | 9      |
|                           | Outdoor - covered reserved area                          | 5      |
|                           | Outdoor – uncovered reserved area                        | 3      |
|                           | No reserved area                                         | 0      |

The floor area is another of the evaluation criteria. The pram room or the bicycle room must have a minimum floor area according to Table 3.

Table 3: Minimum floor area for pram rooms and bicycle rooms (source: SBToolCZ [4]).

| Number of flats in building | Minimum area (m²) |
|-----------------------------|-------------------|
| Family house                | 3                 |
| < 10                        | 10                |
| 10 to 30                    | 20                |
| 31 to 50                    | 30                |
| > 50                        | 40                |

The size of individual basement compartment is considered sufficient if the basement compartment has minimum floor area dimensions of 1.9 x 1.1 m at least whereas the requirements for both dimensions must be met). If the minimum floor area is not met, then the points given for the position of storage rooms are reduced by a multiple of 0.5.

If there are more types of storage rooms in the building, then credits are determined for safety of storage rooms and their positions for each type of such room separately. But if each flat has a basement compartment, then credits are reduced adequately to the representation of quantity. The final evaluation is obtained as the sum of weighed averages of the points given for the safety of storage rooms and their positions in individual types of storage rooms, but 10 points at the most.

Other facility rooms located in the residential building, such as linen drying room, laundry room and others, are evaluated according to floor areas of the closed spaces that are accessible from common area and for all inhabitants.
The common circulating area and the one located in the exterior of the building are not included. The floor area of the premises is calculated according to equation (1):

\[ HP = \frac{PSP}{PB \times 0.5} \]  

(1)

where PSP is the sum of floor areas and PB is the quantity of flats in the residential building under evaluation.

Awarding points is implemented by linear interpolation according to limit values. If \( HP \geq 2 \), it is then given 10 points. If \( HP \leq 0.2 \), it is then given 0 points \([4]\).

Except for evaluation of the residential building facilities, another three criteria are evaluated to determine the quality of user convenience. The existence of balcony or loggia, heating system, hot water preparation and ventilation ranks among them. The final credit evaluation of all categories, having an influence on residential building user convenience, is then their arithmetical average.

4 Designing spaces for storing bicycles and prams in new future buildings according to technical requirements

Current technical requirements for building are the document that substantially influences the form of new buildings. These are currently updated. In the field of traffic serviceability, the regulation being prepared indicates the establishment of bicycle parking racks for the first time. It is just a recommendation where there is no specification providing sufficient quality of bicycle parking racks established. It is necessary to provide the availability of bicycle space without carrying bicycles upstairs and locking the bicycles in spaces shared by a larger number of users must be possible. Bicycle parking racks in residential buildings must be roofed-over to be able to use them for storing bicycles also in winter. The number of parking places proposed for bicycles in residential buildings (1 place per 120 m\(^2\) of floor area) is derived from the number of bicycles held in households (1.5 bicycles per household in Prague) as roughly one third of the requirement valid in the Netherlands and (per occupied area) one tenth of the requirement valid for cars \([5]\). The proposal provides larger houses with freedom whether a bicycle room is to be established, a suitable part of collective spaces is utilized, or the place to store bicycles is reserved in garages – the main thing is that the given place is created.

The full quotation of the proposal for changes to the paragraph in the Technical Requirements for Building from 14.2. 2014:

1. Buildings are usually provided with areas for storing bicycles with the capacity according to a particular intention and location of a building. Areas for parking bicycles are established namely at civic amenities.
2. Surfaces for parking visitors’ bicycles are established with public access and they must afford opportunity to lock the bicycles. It is recommended establishing approximately one parking place per bicycle per ten parking places for cars.
3. The places for storing bicycles of permanent users of building are usually established beyond the public area. This area must be accessible from a street or access road without using a staircase or lift. Minimum reserved area is 1.5 m² per one parking place. If a special room is reserved for storing bicycles, it must have an area of 4 m² at least and width 1.5 metre at least. If no special room is reserved for storing bicycles, and if more than 5 dwelling units share the area for storage of bicycles or if it is an area in the building not intended for dwelling, locking the bicycle must be possible.

4. For buildings designed for dwelling, it is necessary to establish the area for storing bicycles to the extent of 1 parking place for each started 120 m² of the floor area (however, maximum 2 places per unit). This space must be roofed-over. If the requirements for storing bicycles according to (3) are met by basement or garage appropriate for the dwelling unit, it is not necessary to establish an area for bicycle storage [6].

5 Conclusions

The concept of a building is always a natural response to the user's needs so the contents of residential building facilities cannot stem from fixed principles. Moreover, it is necessary to realize that developers determine the contents of residential building facilities especially with regard to the highest possible gains from their investments. Before designing layouts of a building and flat, it is necessary to clarify the demands for operational linkages, functional and areal requirements. Therefore, it is necessary to think about the necessity of some spaces in residential buildings and possibilities of utilization for other more convenient purposes for the inhabitants of the building. However, sustainability must always be kept in mind and not to design functions to these spaces that will lose their usefulness and usability after some time and return to the same situation in which they are found at the outset.

Acknowledgement

The work was supported by the Student Grant Competition VSB-TUO. The project registration number is SP2015/127.

References

[1] Housing and dwelling stock as per population census results. In: Sčítání lidu, domů a bytů (Population Census) [online]. 2014 [quot. 11/04/2015]. Available from: https://www.czso.cz/documents/10180/20551777/17021614.pdf/6bf03ae5-3196-464e-9200-611e97ba8484?version=1.0

[2] EkoWatt, Centre for Renewable Energy Sources and Saving. EkoWatt – Panelové domy (prefab residential buildings) [online]. 2010 [quot. 20/04/2015]. Available from: http://panelovedomy.ekowatt.cz/
[3] ČSN 73 4301. Residential buildings. Czech Rep.: Czech Standards Institute, 2004.

[4] SBToolCZ methodology, evaluation of residential buildings: Uživatelský komfort (User convenience) [online]. Prague, 2012 [quot. 02/04/2014]. Available at: http://www.fce.vutbr.cz/PST/kolar.r/files/SBTo ol_CH09_S06.pdf. Term paper. ČVUT Faculty of Building.

[5] Bouwbesluit 2012. Hoofdstuk 4. Technische bouwvoorschriften uit het oogpunt van bruikbaarheid: Afdeling 4.5. Buitenberging, nieuwbouw. The Netherlands: BRISbouwbesluit online, 2012. Available from: http://www.bouwbesluitonline.nl/Inhoud/docs/wet/bb2012/hfd4/afd4-5

[6] Prahou na kole (Prague by bike). In: Budou v novostavbách kolárny? (Will there be bike rooms in new buildings?) [online]. 2014 [quot. 23/04/2014]. Available at: http://prahounakole.cz/2014/02/budou-v-novostavbach-kolarny/