

## INCREASING USER COMFORT OF HOUSING FACILITIES BLOCKS OF FLATS IN THE CZECH REPUBLIC

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**Abstract:** An essential requirement of these days in the Czech Republic is to increase sustainability of new and existing buildings and increase the benefits of their future use. This applies especially to the houses and flats, where the demand for user comfort and spatial efficiency is rising. User comfort and efficiency have so far been dealt with first of all with focus on the flat alone, whereas the other areas of blocks of flats were neglected. 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. Therefore this article focuses on the facilities in blocks of flats and their influence on the overall user comfort.

**Keywords:** block of flats, housing, flat, facilities, spatial, user comfort.

### 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. From the social and cultural view, user comfort plays a key role. When evaluating the complex quality of buildings from a wide array of sustainability criteria, the 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. Therefore this article focuses on the facilities in blocks of flats and their influence on the overall user comfort in blocks of flats..

### 2 Housing stock in the Czech Republic

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 %). (czso.cz)

Houses, flats, type of house	Population Census Year		
	1991	2001	2011
Houses total	1 868 541	1 969 018	2 158 119
Family houses	1 605 227	1 732 077	1 901 126
Residential buildings	228 566	196 874	214 760
Other buildings	34 748	40 067	42 233
Flats total	4 077 193	4 366 293	4 756 572
In family houses	1 795 462	2 005 122	2 256 072
In residential buildings	2 244 947	2 310 641	2 434 619
In other buildings	36 784	50 530	65 881

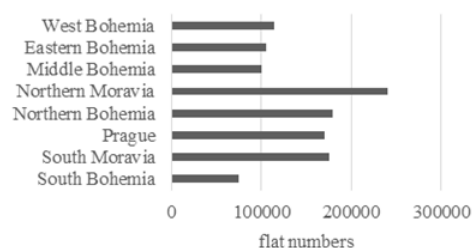
Tab. 1: Development of housing stock between population censuses in 1991 and 2011, Population Census Year (source: czso.cz)

Houses, flats, type of house	Growth index (in %)		
	2001 1991	2011 2001	2011 1991
Houses total	105.4	109.6	115.5
Family houses	107.9	109.8	118.4
Residential buildings	86.1	109.1	94.0
Other buildings	115.3	105.4	121.5
Flats total	107.1	108.9	116.7
In family houses	111.7	112.5	125.7
In residential buildings	102.9	105.4	108.4
In other buildings	137.4	130.4	179.1

Tab. 2: Development of housing stock between population censuses in 1991 and 2011, Growth index (in %) (source: czso.cz)

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. (Census - czso.cz)



Graph 1: Number of flats in panel buildings in individual parts of the Czech Rep. (source: processed by EkoWATT)

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 CR: BANKS, B 70, G 57, HKS 70, Larsen & Nielsen, OP 1.11, OP 1.21, PS 69, PS 69/2, T 06 B, T 08 B, VVÚ ETA.

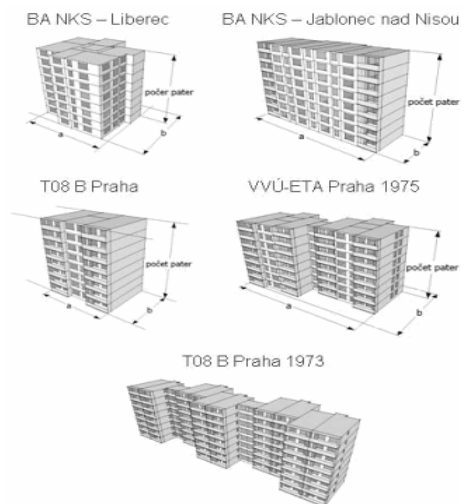


Figure 1: Types and variants of construction systems. (source: EkoWATT)

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 pre-fabricated 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 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. (Census - czso.cz)

While 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. 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 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.

### 4 Influence of Household Equipment for evaluation user comfort apartment buildings according to the methodology SBToolCZ

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.

Item	Description	Credits
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

Table 3: Table for evaluation of bicycle and pram rooms and basement compartments (source: SBToolCZ Methodology)

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 4.

Number of flats in building	Minimum area (m <sup>3</sup> )
Family house	3
< 10	10
10 to 30	20
31 to 50	30
> 50	40

Table 4: Minimum floor area for pram rooms and bicycle rooms (source: Methodology SBToolCZ)

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):

$$HP = PSP/(PB \times 0.5) \quad (1)$$

,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. (Vonka, 2012)

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.

## 5 Research and Utilization space efficiency of Residential Buildings Household equipment for Determining User Comfort

The subject of research in the project to research the usability and space efficiency of residential buildings house equipment, from which this post is supported, is solved in the context

dissertation topic „Research on new forms of housing in the context of optimizing the space of residential buildings“. The current unstable global economic situation is not very favorable to new construction investments. Conversely, an essential requirement today is for enhancing the sustainability of new projects and existing buildings and increase their future benefit. This state is especially true for a group of housing stock; increasing demands for user comfort and space efficiency of residential buildings. Both of these criteria as a result of the important influence speak to the operating costs of residential buildings. In the methodology of the national instrument for quality certification of buildings according to sustainability principles SBToolCZ the criterion of user comfort weight of 3.2% and spatial efficiency criterion of 2.5%. (Vonka, 2012)

For the present project has been and will continue to be used a combination of theoretical and empirical methods. As a general input method project was implemented analysis of past and current requirements for the existence of house equipment. The analysis was performed through relational analysis focused on the analysis of legal and normative materials, as evidenced by the analysis portion of the sample is processed in this paper, see above. This method was chosen for its best explanatory power to reach certain results based on a detailed understanding of the details.

To determine the real state of usability house equipment will be used method of direct survey questionnaire form. Questionnaires will be sent to owners of residential buildings or their administrators and the general public to obtain the greatest possible range of respondents. Choosing this method to determine the real usability of house equipment is destined absence of any statistical information. Subsequently, descriptive statistics will be used to sort the measured values, their assembly into tables and graphs.

The research objective is to prove or disprove the hypothesis that domestic equipment is not really sufficiently exploited and on the basis of this result to suggest modifications subsequent forms of legal and technical standards governing the issue in question (eg. A partial moving surfaces to surfaces accessory apartment - bath, cellar rooms etc.). Achieving goals also relies on the ability to design implementation evaluation areas house equipment into the overall calculation of the quality certification of buildings according to sustainability principles SBToolCZ, which was mentioned in the previous chapter. Usage adjustments is expected to further solution.

## 6 Conclusion

The difference in flatness flats and apartment buildings house equipment is considerable. This also has an impact on its utility and space efficiency and consequently the overall user experience of residential houses. This concludes the need to develop spaces in residential buildings diverse, scalable and flexible, with an emphasis on the changing needs of the population.

Current city type person whom the population of today's Czech Republic without doubt is that increasingly tends not only to live in a family house outside of town, but also for living in an apartment in an apartment building, but which in this case must offer apartments with different number of rooms and flatness as well as comfortable space associated equipment, such as household equipment.

Minimized surface require thorough rethinking every detail. Link works civil engineering and architecture, sophisticated layout, based on the craftsmanship of today's real requirements, consistent work and participation of specialists from other professions can provide a perfect finish to the last detail. Finally, it should also be said that it is appropriate to focus on the organization consistently in the layout of the rooms and their proportional relationship. Consistently apply the material and aesthetic quality in production. Ensure efficiency, utility,

material and aesthetic quality of the user experience brings desirable.

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