

Survey US Ability and Spatial Effectiveness of Housing Facilities in Blocks of Flats in the Czech Republic

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Abstract: 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 study focuses on the facilities in blocks of flats and their influence on the overall user comfort in blocks of flats.

Key words: Block of flats, housing, flat, facilities, spatial, user comfort, study

INTRODUCTION

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 study focuses on the facilities in blocks of flats and their influence on the overall user comfort.

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%). (CSO) Table 1. Living in multifamily houses in the Czech Republic refers to a significant portion of the total number of inhabitants (Zdarilova, 2007). 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 (CSO) (Fig. 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 CR: 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, VVU 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

Table 1: Development of housing stock between population censuses in 1991 and 2011 (CZSO.CZ)

Houses, flats, type of house	Population census year			Growth index (%)		
	1991	2001	2011	2001-1991	2011-2001	2011-1991
Houses total	1868541	1969018	2158119	105.4	109.6	115.5
Family houses	1605227	1732077	1901126	107.9	109.8	118.4
Residential buildings	228566	196874	214760	86.1	109.1	94.0
Other buildings	34748	40067	42233	115.3	105.4	121.5
Flats total	4077193	4366293	4756572	107.1	108.9	116.7
In family houses	1795462	2005122	2256072	111.7	112.5	125.7
In residential buildings	2244947	2310641	2434619	102.9	105.4	108.4
In other buildings	36784	50530	65881	137.4	130.4	179.1

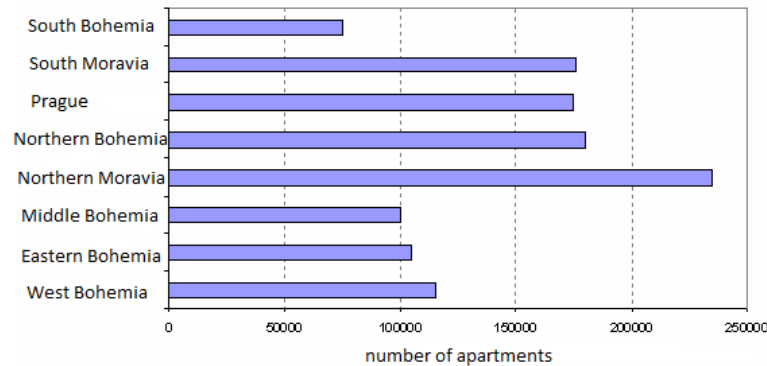


Fig. 1: Number of flats in panel buildings in individual parts of the Czech Rep (EkoWATT)

reconstruction of residential buildings in light of internal lay-outs has not yet been considered for years.

While in the 1960 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.

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 CSN 73 4301 about housing in the Czech Republic as mandatory for ensuring the economic and technical operation of a residential building.

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 CSN 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 (Dagmar and Ceselsky, 2015)

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 (Vitezslav and Frantisek, 2005).

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.

MATERIALS AND METHODS

Influence of household equipment for evaluation user comfort apartment buildings according to the methodology SBTToolcz: The purpose of user convenience evaluation according to SBTToolCZ 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 and 3). 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.

The size of individual basement compartment is considered sufficient if the basement compartment has minimum floor area dimensions of 1.9×1.1 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 Eq. 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 $HP = 2$, it is then given 10 points. If $HP = 0.2$, it is then given 0 points.

Table 2: Table for evaluation of bicycle and pram rooms and basement compartments (SBToolCZ methodology)

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 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: Minimum floor area for pram rooms and bicycle rooms (methodology SBToolCZ)

Number of flats in building	Minimum area (m ²)
Family house	3
<10	10
10-30	20
31-50	30
>50	40

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.

Designing the 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 m² 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. 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: 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. Surfaces for parking visitor's 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. 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 m at least. If no special room is reserved for storing bicycles and if >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. 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.

RESULTS AND DISCUSSION

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

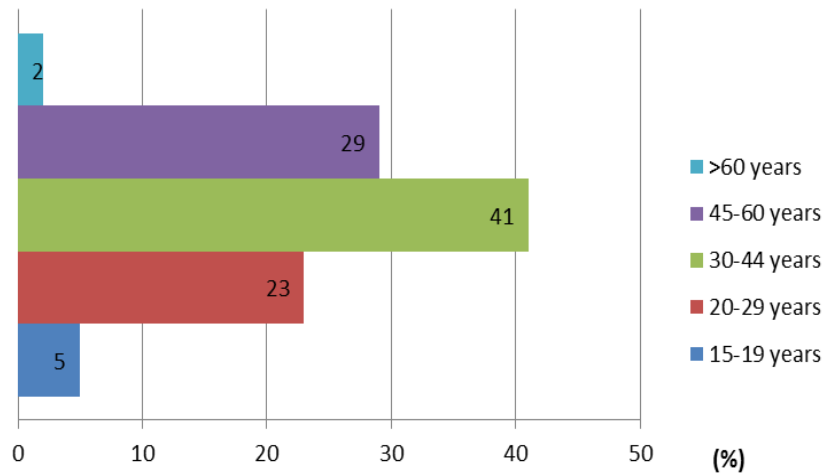


Fig. 2: Age structure of the respondents (Researcher’s archive)

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%

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, (e.g., 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.

Report on a questionnaire survey usability and spatial effectiveness of housing facilities in blocks of flats:

Questionnaires called survey usability and spatial effectiveness of housing facilities in blocks of flats was between May and October 2015 and circulated publicly accessible on the portal NetQuest (portal for creating and publishing a public survey questionnaire form) to obtain a broad range of respondents. As stated in the previous section for sorting the collected data was used descriptive statistics. Descriptive statistics identifies and summarizes the information is then processed in the form of graphs and tables. This method was created by a report containing only those questions to which the respondents provided answers (Fig. 2).

Contents of the report

What year were you born? This question could be regarded as the age structure of the respondents which is of course in any questionnaire survey important from a demographic standpoint. The graph shows that most respondents who questionnaire handed, belong to the

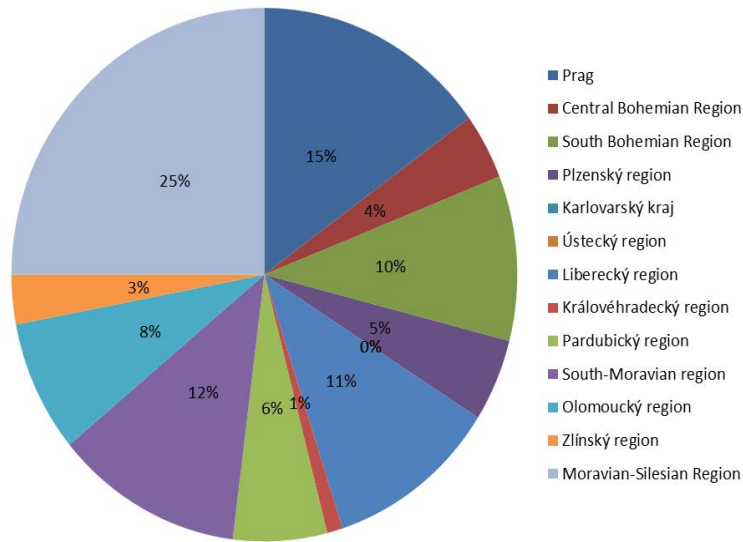


Fig. 3: Permanent residence of the respondents (Researcher’s archive)

age group 30-44 year without distinction of sex. Another significant group becomes group 45-60 and 20-29 year which are all age groups of respondents of working age. These results also could be used for other computational methods demographic structure of the population that currently are not subject to this investigative solutions (Fig. 3).

In the region in which you reside Czech Republic?: The graph shows that the largest number of respondents domiciled in the region. Other regions with negligible values include the capital city Prague, South Bohemia region, Liberec region, South Moravia and possibly also the Olomouc region. In other regions, the value of the submitted questionnaires too small and therefore within a counties would not answer inquiries meaningful values but nationwide ratings are of course valuable.

What is your kind of housing?: On the basis of the answers can be concluded that the largest number of respondents live in an apartment located in a block of flats (62%). The proportion of apartments in brick building is nearly double.

What kind of your apartment in terms of size?: The questionnaire solution is clear that the largest number of respondents lives in an apartment 3+1, it is by 35% or if the 52 people. Other respondents, mostly occupied dwellings by size is 2+1 with 19%, 2 bedroom apartment with 14% and 3 bedroom apartment with 12%. Flats of other sizes generally make up about 20%, mostly smaller

sized homes, only 3% of the total housing consists of 4 bedrooms. Residents of the larger flats will not participate questionnaire (Fig. 4 and 5).

Which of the following type of house facilities are located in your house?

Which of the following types of house facilities that are located in your house, actually use it?: Of the two previous graphs can be seen that house equipment such as letter-box, rubbish disposal, cellar, storage room, parking space and space for the collection of their existence in an apartment building 100% or nearly 100% in real terms are used. Conversely, household equipment such as space heating, maintenance, laundry, mangle and a carpet are knocking at their existence in an apartment building not used by almost all. Other household equipment is used variously, for example depending on location, size of dwelling respondents or the population structure of a residential building (Fig. 6).

It’s space house equipment sufficient for your needs?: The survey shows that some species of house facilities mostly do not meet the needs of the residents of apartment buildings. These include mainly bicycles and bike room, cellar, parking areas and modifications flat roofs (which exist only 4% of residential buildings respondents) (Fig. 7).

You used these facilities house equipment, if found in your house?: If the residential buildings of the respondents found (assuming that they are not) areas

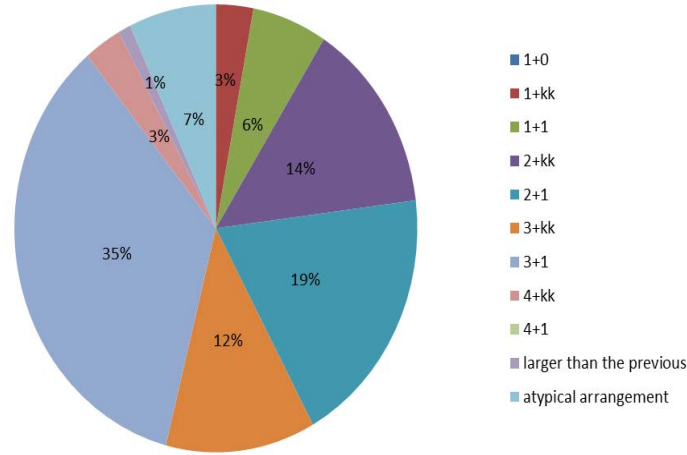


Fig. 4: The size of apartments the respondents (Researcher's archive)

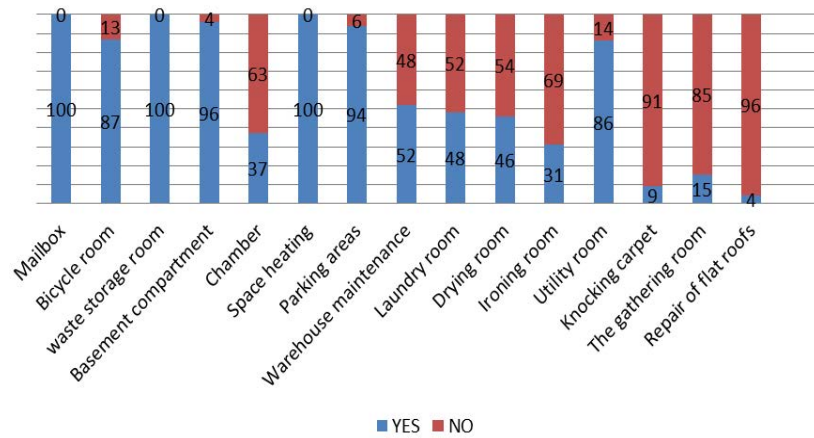


Fig. 5: The existence of home furnishings in the apartment building the respondents (Researcher's archive)

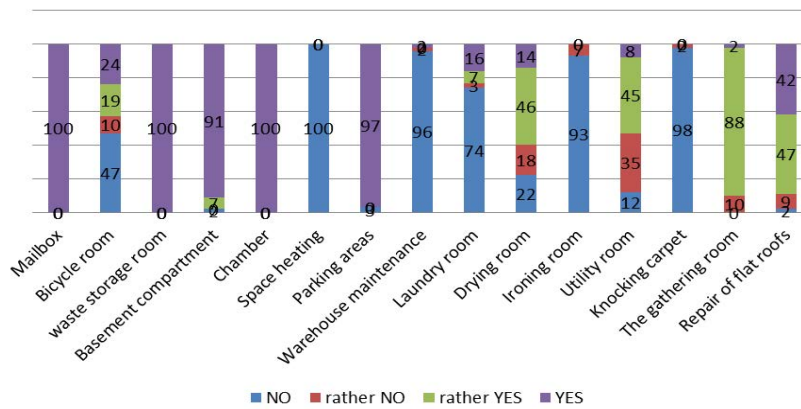


Fig. 6: The real usefulness of home furnishings the respondents (Researcher's archive)

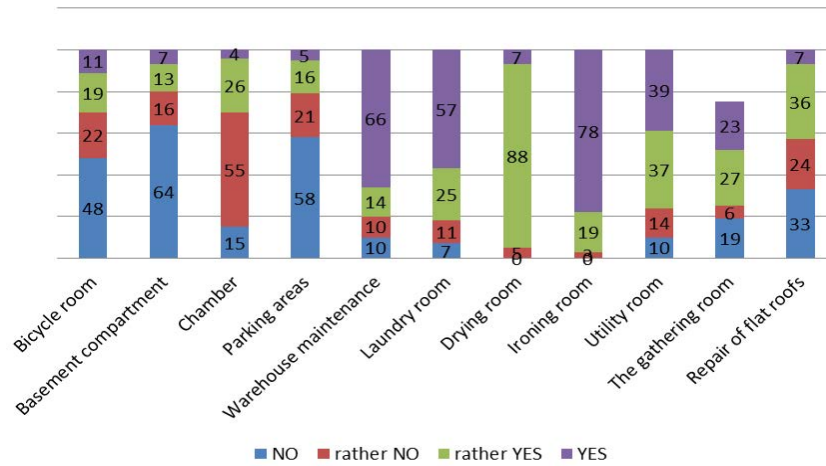


Fig. 7: The sufficiency of house equipment needs of the respondents (Researcher's archive)

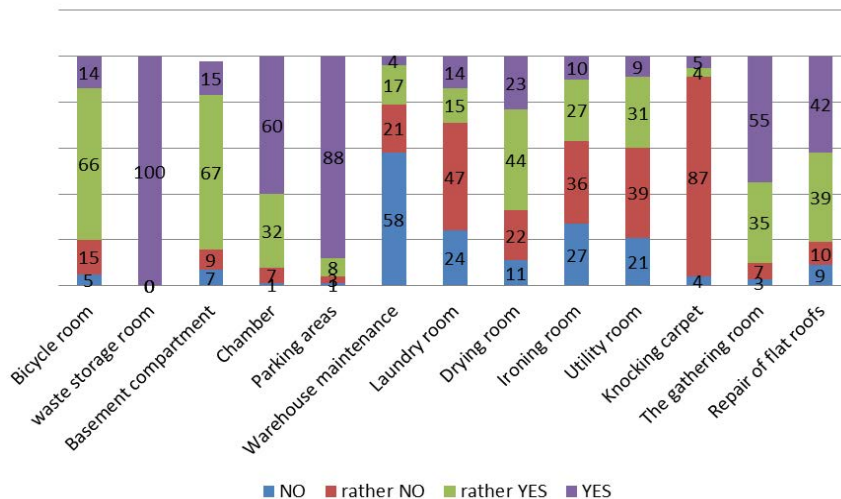


Fig. 8: The need for home furnishings in the apartment building the respondents (Researcher's archive)

such as bicycles and bike room, space for storing garbage, cellar, storage room, parking area, drying facilities for collecting and landscaped roof area, so those spaces used.

What function performs the following household equipment in your house? The original purpose of house equipment as suggested in today fulfills according to the statement of respondents only letter-box space to store garbage, space heating and parking areas. Predominantly a cellar.

Where can you hope to have in your house a room for storing objects outside the apartment? The chart can be

seen that 34% of respondents would like to have in a residential building space for storing items on the floor near his apartment or in the basement as a cellar (20%), on the ground floor near the main entrance (17%) or Also in separate spaces in the immediate vicinity of the apartment building (15%).

How can, in your opinion, to improve the situation of home furnishings in an apartment building? This single question was open to respondents' opinion 20 words. On this final question, respondents answered in much the same way regardless of their permanent residence, apartment size and space utilization and efficiency of home furnishings (Fig. 8). And the demand for more

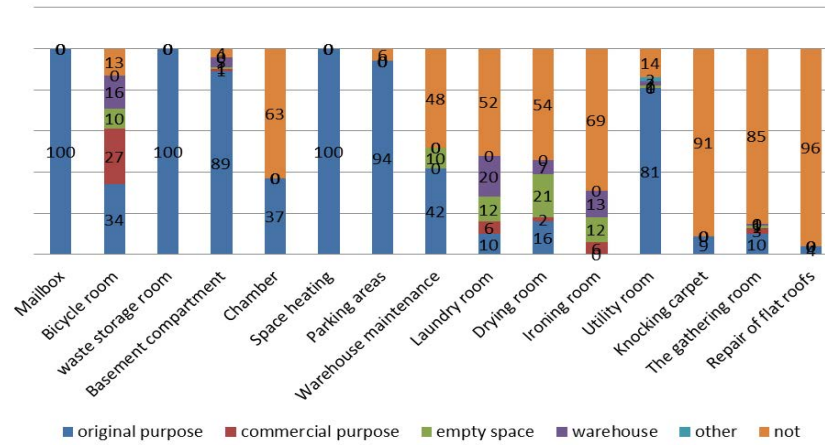


Fig. 9: The house equipment in a residential building the respondents (Researcher’s archive)

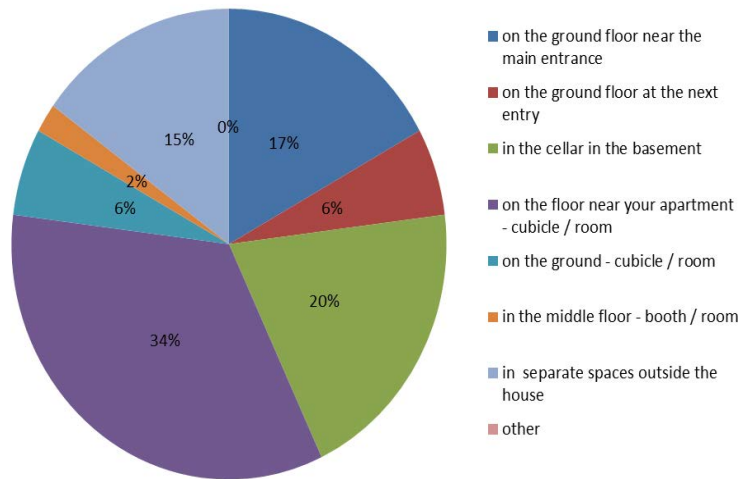


Fig. 10: Location of space for storing items in the apartment building the respondents (Researcher’s archive)

storage space in the apartment or outside the apartment and larger acreage, more parking spaces and most importantly was about 70% of the respondents safety. The security discussed in conjunction with domestic equipment, entrance door but also surrounding residential buildings (Fig. 8-10).

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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